IRON and STEEL
ENGINEER

J. F. KELLY, Editor

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Published Monthly by

Association of Iron and Steel Electrical Engineers

706 Empire Building, Pittsburgh, Pa.

Entered as second-class mail matter January 25th, at Pittsburgh, Pa., under the Act of March 3rd, 1879.

Subscription Price $5.00 per Year. Single Copy 50c.

MEETINGS AND PAPERS

PHILADELPHIA SECTION

P. T. Vanderwaart, Chairman — **L. O. Morrow, Secretary**

Saturday, February 7th, 1925

"Operating Results obtained with the use of Static Condensers," by Wray Dudley, Elec. Supt., Ashland Division, American Rolling Mill Company, Ashland, Ky.

Engineers Club — **Philadelphia, Pa.**

CHICAGO SECTION

R. L. McIntosh, Chairman — **W. H. Williams, Secretary**

Thursday, February 26th, 1925

"Can the Synchronous Motor be successfully applied to Steel Mill Main Drives."

Atlantic Hotel — **Chicago, Ill.**

CLEVELAND SECTION

R. E. Scoval, Chairman — **A. R. Lintern, Secretary.**

Saturday, February 14th, 1925

Hotel Statler — **Annual Dinner Dance** — **Cleveland, Ohio.**

PITTSBURGH SECTION

R. E. Lewis, Chairman — **John F. Kelly, Secretary**

Friday, January 30th, 1925

"Electrically Heated Soaking Pits," by T. F. Bailey, Bailey Furnace Company, Alliance, Ohio.

Saturday, February 21st, 1925

"A Discussion of present day Wire Rope Problems," by J. F. Howe, American Steel & Wire Company, Worcester, Mass.

William Penn Hotel — **Pittsburgh, Pa.**

BIRMINGHAM SECTION

F. G. Cutler, Chairman — **W. W. Garrett, Secretary**

W. H. Dunn — **Executive Committee** — **W. H. Gilbert**

A. F. Elliott — **W. B. Connally**

Saturday, January 31st, 1925

"Fuel Application: The Essential Factor in Furnace Design," by F. J. Evans, Engr., The Surface Combustion Company.

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EDITORIAL

How often do we hear that this is the Age of Iron and Steel of invention and machinery?

On every hand we watch the march of progress and wonder what next.

Those things of yesterday which staggered our imagination seem to be commonplace today.

What has electricity's contribution been to the rapid strides and to the progress that has been in the art of steel making. If the presidents of the Iron and Steel Industries have been quoted correctly electricity has been one of the main factors in helping to make the steel industry the leader of the world's industrials.

Not long ago the president of one of the largest Steel Companies in the United States voiced the opinion that in the course of ten years the steel industry would be completely electrified.

At this time it would not be amiss to dwell briefly upon one important advancement that was made during the year 1924. Heretofore the Soaking Pit has presented one of the most stubborn problems that electricity had to overcome. It was the general belief that Electrically heated pits could not compete with gas fired equipment. However, the installation now in successful operation at one of the large Steel companies does not bear our this belief.

A review of the January issue of the Iron and Steel Engineer will reveal what has been electricity's contribution to the Iron and Steel Industry during the year 1924. The story of the tiny fuse as well as the 62,500 K.V.A. Turbine is chronicled for your information.

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Electrical Developments in the Iron and Steel Industry for the Year 1924

THE RELIANCE ELECTRIC & ENGINEERING COMPANY

In view of the interest expressed by steel mill engineers in the use of anti-friction bearings in electric motors, special attention has been given to this development during the past year. Our Type T Motors for direct current are now supplied when desired with either ball or roller bearings in sizes up to 75 h.p. 1150 r.p.m.

During the year opportunities have occurred on installations of a quantity of machines of the same size

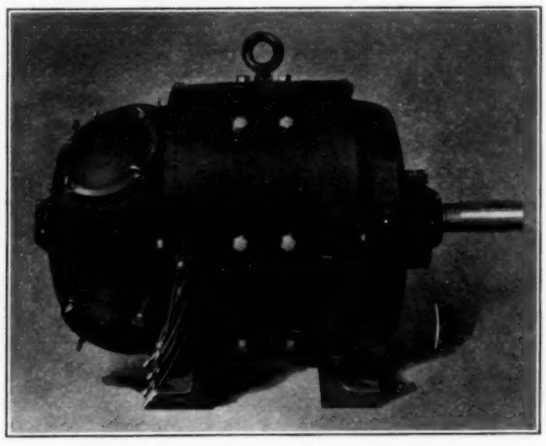

FIG. 1

and type to include ball bearings in some and roller bearings in others. Different makes of both types of bearings were also used so that their operation could be observed under the same conditions.

In connection with the development of the anti-friction bearing design the opportunity has been of-

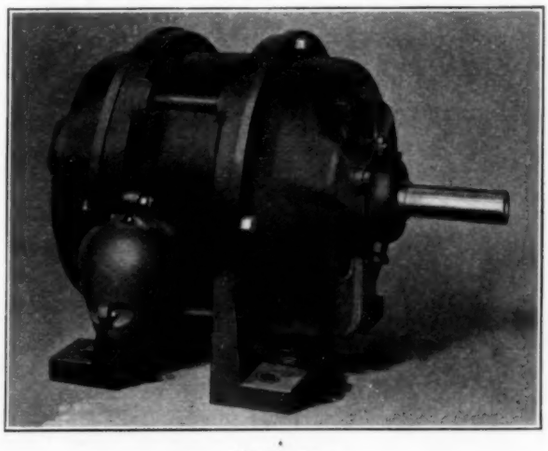

FIG. 2

fered to improve on the construction of enclosed dust-tight motors. With the usual construction it has not been possible to keep out all dust under the conditions found in coke and sintering plants. The use of anti-friction bearings insures a dust-tight construction for the bearings. The further improvement is the use of solid end brackets for the back end and solid brackets having hand hole covers at the front end. The seats for the covers are machined. The covers are machined and fitted with rubber gaskets, thus making sure of really dust-tight joints. This construction is the same as used for water-tight motors supplied for navy use.

Our Type AA Squirrel Cage Induction Motors have also been developed for both ball and roller bearings. As in the case of the direct current motors, the two types are interchangeable for the same frame size of motor.

Some of the new and interesting applications of motor drive are adjustable speed individual motor drive for wire blocks, 100 h.p. reversing motor drive on frog and switch planers, and 10:1 speed range motor drive on galvanizing take-up frames.

RUMSEY ELECTRIC CO.

The year 1924 was a very successful one from every viewpoint for the Rumsey Electric Company of Philadelphia.

The meter, transformer, high tension equipment and associated material showed a decided increase, as well as supplies and radio.

Many customers have been added. The territory has been enlarged and now embraces all of New Jersey, except the Metropolitan district, Pennsylvania, east of Johnstown, all of Delaware and Maryland, and parts of Virginia, West Virginia, North Carolina.

Successful campaigns have been launched on various lines and the results have been very pleasing. The company believes that in order to render the customer the greatest possible service, men especially trained in certain lines are necessary. To this end they employ a transformer engineer, a meter engineer, a lighting engineer and a specially trained lamp man. These men, in conjunction with the entire organization, are anxious to render all the service possible.

The Ramsey Electric Company take this opportunity to express the hope that they may be privileged to extend their service over a greater field and are constantly striving to build an organization that can meet every demand.

DELTA STAR ELECTRIC CO.

Developments in Remote Control Disconnecting Switches.

Remote control gang operated disconnecting switches are being used more and more, as men are safer than when operating hook stick switches. They also reduce accidents caused by operators pulling disconnects on two phases of a dead circuit and one phase of an adjacent live circuit—a common mistake and the cause of some serious shutdowns. Should operators open three pole gang operated switches on a loaded circuit they have a better chance to get away unhurt than when pulling hook stick operated switches under load. It is easy to provide interlocks between a gang operated switch

mechanism and the oil switch so as to avoid such accidents, but with hook stick operated switches interlocks are often difficult to install.

However, a valuable feature of remote control

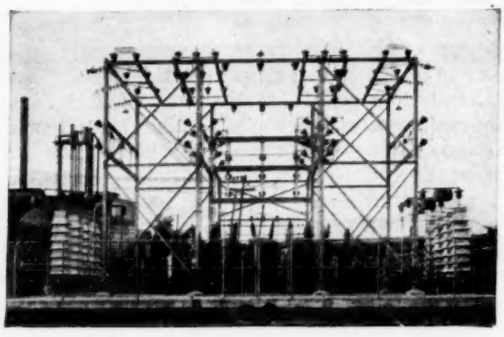

FIG. 1

disconnecting switches, and one not always appreciated by engineers, is the saving in aisle space and freedom from arrangement limitations when planning layouts. Operating mechanisms for gang operated switches can be brought down at any point convenient for the operator, thereby eliminating apportioning of additional aisle space to secure clearances for hook stick operated switches.

A very simple three pole gang operated disconnecting switch designed particularly for the purpose of saving aisle space in an arrangement requiring a considerable number of oil switches is illustrated. This switch is installed immediately above the oil switch with the supporting channel running at 90 degrees to the main operating aisle. The operating shaft extends beyond the channel into the aisle space on both sides of the aisle. Insulating handles provided with adapters to fit the squared shaft ends permits simultaneous operating of the three blades. These switches are manufactured by the Delta-Star Electric Company, Chicago, Ill.

Development in Bus Supports.

In high-capacity stations the main bus is one of the most vulnerable places, and this necessitates extreme care in both design and installation of the bus supports. Failure of a support may produce a

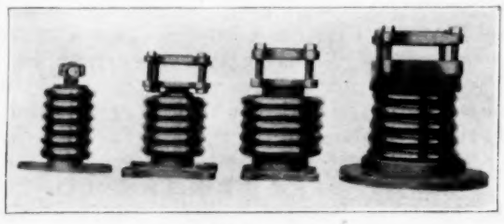

FIG. 2

disastrous short-circuit and in any case will entail complete shutdown of certain sections. As the main bus may be considered a principal artery of the system, care must be taken to safeguard it.

In small capacity stations it is only necessary to guard against electrical failure of the bus support. This simply entails the use of a larger porcelain, giving a higher safety factor than ordinarily required for substantial work.

In stations of large capacity, however, short-circuits on the outgoing feeders or station equipment will develop tremendous momentary short-circuit currents, which will "motorize" the buses, setting up forces between bars which may easily reach values of several hundred pounds per foot of bus. The problem becomes one of mechanical strength and due to the comparatively low mechanical strength of porcelain is not easily solved.

A mere increase in bulk of porcelain will often lower, rather than increase the mechanical strength and may also lower the electrical qualities. The well-known laws of mechanics can, therefore, only be applied after a thorough study of the nature, characteristics and manufacture of porcelain.

To meet the condition found in both small and large capacity stations, the bus supports illustrated have been designed by the Delta-Star Electric Company, Chicago, Ill.

Developments in Bus Clamps.

A recent development of importance to steel mill engineers is the extra heavy "Curvback" clamps which insure a heavy uniform pressure over the en-

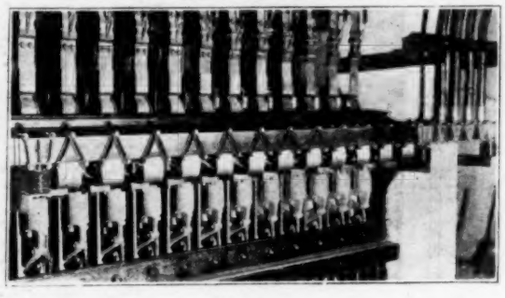

FIG. 3

tire clamped surface—and automatically indicate when they have been sufficiently tightened to secure maximum pressure without bending beyond their elastic limit.

With ordinary clamps pressure is concentrated at the edges, there is nothing to indicate when maximum pressure is reached. The clamps are tightened until they bow and stretch beyond their elastic limit. The danger of this is readily apparent as further stretching of the clamp may take place, either due to fatigue or thermal expansion and contraction.

The latter condition is particularly apt to occur, as uneven pressures result in excessive current at the edges and no current at the middle of the joint—causing heating during peak load, with periodic expansion and contraction.

NATIONAL CARBON CO., INC.

New Carbon Brush Shunts.

During the year 1924 there have been no outstanding new developments in carbon brushes. There are a number of experimental grades of more or less merit in service throughout the country, which indicates a healthy effort to continue the rapid progress in carbon brush development which has been taking place in the past three years.

In the development of carbon brushes and their subsequent application the matter of a satisfactory shunt connection is sometimes overlooked. Up to the present time shunt connections could be clas-

sified almost entirely in the following three groups:

1. Imbeded and Cemented
2. Screwed On
3. Spun Hollow Rivet

On the fifteenth of December, 1924, two radically new types of connections were placed on the market by the National Carbon Company, which are known as No. 26 and No. 21.

The No. 26 connection is similar in appearance to the familiar spun hollow rivet and screw type connections. The method of attachment, however, is radically different in that the use of a solid rivet is made. This gives a much more rugged mechanical connection than has been possible with other types and at the same time a very low electrical resistance connection. This connection can be furnished on practically all styles of brushes in thicknesses greater than 5/16" and with the various types of lifting clips attached for use on rotary converters.

The No. 21 connection permits of longer brush wear than with any other type of connection, with the exception of the imbeded cemented type, which will permit of about the same amount of wear per brush. In attaching this connection a shoulder is cut on the two wide faces of the brush. Through the thickness of the brush are drilled two or three holes, depending upon the brush width. The upper end of the brush is then copper coated and ready for the shunt attachment.

The attachment itself consists of two strips of heavy gauge copper, in one end or both ends of which cable is attached by being folded in under hydraulic pressure and subsequently tinned. These two strips are then attached to the brush by means of solid rivets. The mechanical strength and electrical resistance of this connection are practically ideal. It is virtually impossible to loosen the connection through heating or vibration and the electrical resistance remains constant at the lowest figure which it has been possible to obtain for a shunt attachment.

No. 21 connection is available for brushes of 1¼" to 2" in width and ½" to 1¼" in thickness. Nearly all types of rotary converter lifting clips can be attached to this type of connection, the exceptions being mainly those which require a bevel on the holder end of the brush.

With the use of these new types of connections the factor of variable operations in brushes will be largely eliminated where in the past these troubles have developed, due to loosening shunt connections.

GENERAL ELECTRIC CO.

Steel Mills.

By the addition of 45,350 h.p. (normal continuous rating) of main roll motors during the year, the total of G-E main roll drives has been brought to over 700,000 h.p.

An installation of particular interest is a 14" continuous merchant mill at the plant of the Jones & Laughlin Steel Corporation. The nine stands of this mill are driven by seven adjustable speed direct-current motors.

1—3000 h.p., 200/360 r.p.m.
1—1700 h.p., 90/140 r.p.m.
1—1700 h.p., 90/205 r.p.m.
1—2100 h.p., 150/310 r.p.m.
1—2100 h.p., 150/460 r.p.m.
1—2000 h.p., 210/680 r.p.m.
1—2000 h.p., 260/800 r.p.m.

This mill will roll a very large tonnage of diversified products, and the employment of individual drives with a very wide speed range enables it to do the work of two or three less flexible mills.

The 26" rail mill at the Sparrows Point plant of the Bethlehem Steel Company was changed over from steam to electric drive by the installation of two 3000 h.p., 500 r.p.m., 6600 volt constant speed induction motors. This company also installed two 1250 h.p., 250 r.p.m., 6600 volt induction motors for driving hot tin mills, and another motor of the same rating for driving tin mill cold rolls.

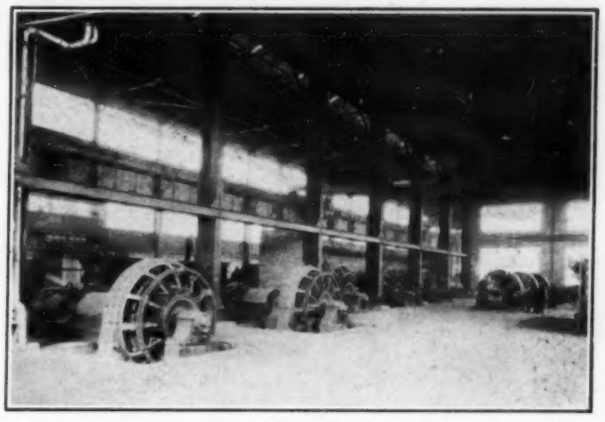

FIG. A—*Motor Room of 20-inch Hot Strip Mill, Otis Steel Company, Cleveland, Ohio, showing Motors and Synchronous Converters*

The installation of the two revolving frame or supersynchronous motors for driving copper rolling mills at the plant of the Rome Brass and Copper Company was completed; each motor being rated 580 kv-a., 0.7 power factor (500 h.p.) 360 r.p.m., 440 volt, 60 cycle.

The two alternating-current brush-shifting adjustable speed motors built for the Halcomb Steel Company of Syracuse, New York, for driving merchant mills, were placed in operation.

The Donner Steel Company of Buffalo, New York, will replace the engine drive on their 34" reversing blooming mill by a 4000 h.p., 58/120 r.p.m., 750 volt direct-current reversing motor. Power for this motor will be derived from a flywheel motor-generator consisting of two 1800 Kw., 500 r.p.m., 750 volt direct-current generators, 78000 lb. flywheel, and one 3000 h.p., 2200 volt induction motor.

Turbines.

The aggregate kilowatt capacity of steam turbines completed and under construction at the close of the year exceeded all previous records.

Among the large units completed and placed in service was one rated at 60,000 Kw., Fig. 1, consisting of a high pressure and a low pressure unit, each driving individual generators.

The first 35,000 Kw. single cylinder turbine, Fig. 2, designed for 550 lb. steam pressure and 750 deg. F. total temperature, was placed in commercial

service in the Philo Station of the American Gas and Electric Company.

Two machines for operation under conditions similar to the 60,000 Kw. unit referred to above were under construction. These machines differ from the larger two-cylinder machines in that they

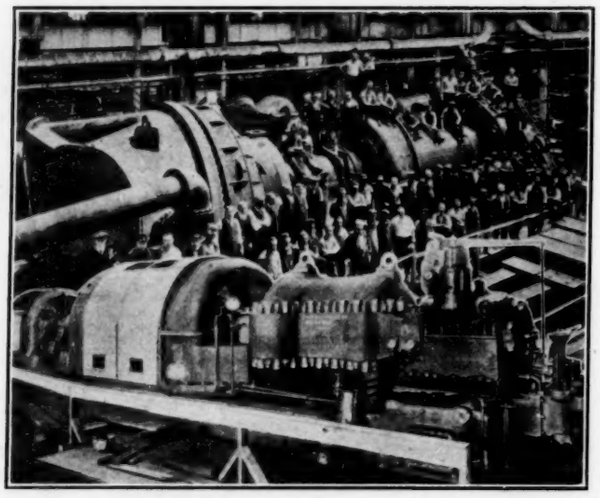

FIG. 1—*View in Turbine Testing Department, showing a 60,000 Kv-a. Compound Steam Turbine Generator for the Commonwealth Edison Company*

do not drive individual generators, but both cylinders are coupled to a single 40,000 Kw. generator.

The first turbine designed for operation with a steam pressure of 1,000 lb. is under construction in the shops. The high operating pressure involved unusually heavy mechanical construction for the turbine casing.

Among the large high-speed machines under construction are some rated at 50,000 Kw., 62,500

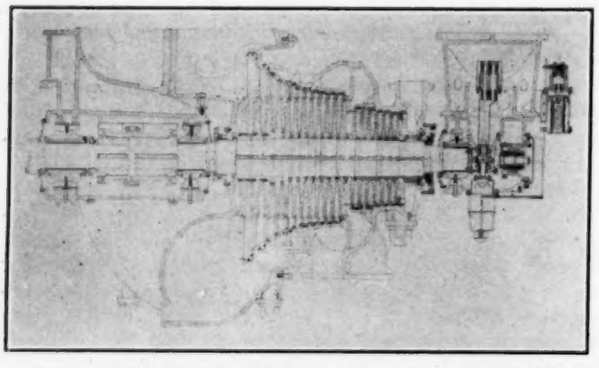

FIG. 2—35,000 *Kv-a Single Cylinder Steam Turbine-Generator for 550-lb. Steam Pressure and 750° F. Total Temperature*

kv-a., 1800 r.p.m. The production of machines of this capacity and speed has been rendered possible by the use of twisted conductors in the armature windings and improved methods of rotor construction. Other machines of exceptional capacity include 60,000 Kw., 60,000 kv-a., 1500 r.p.m. units. All of these large machines when completed, will represent maximum capacities for the speeds at which they operate.

The Emmet Mercury Turbine and Boiler installation made for the Hartford Electric Light Co., Hartford, Conn., attracted a great deal of attention and the success achieved during one year of operation was very gratifying to all concerned. Experience indicated that certain improvements in details can, to advantage, be made and the necessary changes are now being carried out.

Frequency Converters.

The interconnection of power systems has become of great importance in recent years, both from an engineering and economic standpoint. The use of frequency converters for such ties between systems of different frequency has resulted in important developments in this type of equipment.

During the past year a distinctly new type of equipment has been developed, making practical the interconnection of systems where frequency variation between them is such as to prevent the successful use of frequency converters previously available. A new record has also been made in the maximum size of frequency converters, as an order has been placed for a 25 to 60 cycle set having a continuous capacity of 40,000 Kw., 25 to 60 cycles and 38,000 Kw. in the reverse direction. The largest machines previously built were rated 35,000 Kw.

When a rigid frequency tie is made (as in the case of a synchronous set" a fixed relation must be maintained between the speeds of the two systems so that if frequency of one system changes from time to time, the other must make corresponding changes. Otherwise, the set will pull out of step. Load transfer must be regulated entirely by setting of governors on prime movers of the two systems and the set can only be synchronized by adjusting the speed of the two systems.

The G-E Company has put on the market a type of frequency converter in which the above operating limitations are overcome. This is known as the "Scherbius Controlled Speed Regulating" type of set. It consists of a synchronous generator direct connected to an induction motor, with a Scherbius speed regulating set of the type ordinarily used for varying the speed of an induction motor for driving steel mills. This regulating set makes it possible to hold any desired load with the ratio of frequencies of the two systems at any value within the range of the equipment. The speed regulating type of set does not require a fixed relation between the two system freqeuncies. It can remain connected between systems and deliver load in proper amount and direction with variations in system frequencies within limits for which the set is designed.

It can be arranged to hold constant load in either direction with speed variations of either or both systems, by control of the set itself, not requiring governor control of prime movers of two systems to regulate load on the set.

Two sets of this type, each rated 6,000 Kw., have been installed by the Rochester Gas and Electric Corporation, forming a tie between the Rochester 60-cycle system and the Niagara, Lockport & Ontario 25-cycle system. These sets provide for a total variation of 9 per cent in the two-system frequencies. Thus, with the frequency of one system constant, the other may vary 9% above or below normal, and with both system frequencies vary-

ing, the total variation can be 9%. Each set consists of a 7500 Kva-11000 V. 3 phase-60 cycle synchronous generator direct connected to an 8500 HP—11000 V. 3 phase—25 cycle wound rotor type induction motor. Scherbius regulating equipment is provided for the latter, consisting of a separate 300 Kva. regulating set, an ohmic drop exciter direct connected to the main set and two small rheostats and control transformers. If the 60 cycle system frequency is constant the sets will operate at a constant speed of 720 r.p.m. Depending on the frequency of the 25 cycle system, the induction machine will operate at above or below synchronism. The Scherbius type control equipment for the latter machine controls the load transferred.

Fig. 3 is photograph of main set with ohmic drop exciter and direct current exciter for field of synchronous machine.

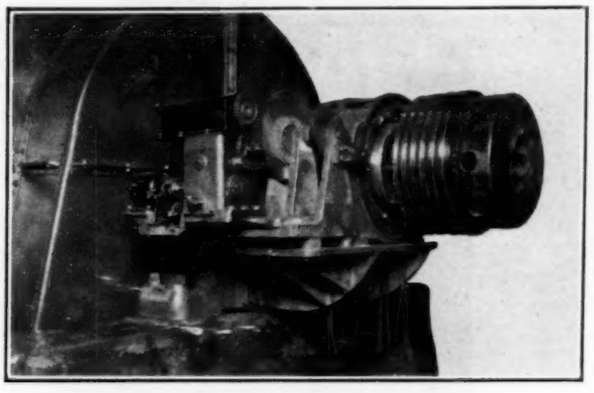

FIG. 3

In the January, 1924 number of the "G. E. REVIEW," a description was given of the 35,000 Kw. induction synchronous frequency converter built in 1923 for the Hell Gate Station of the United Electric Light & Power Company, New York City. This unit has now been in operation over a year and not only met its specifications, but had a sufficient margin so that with slight modification of the 25 cycle machine it was possible to design a second set of increased capacity with the same dimensions. This set is now under construction for the East River Station of the New York Edison Company and has a rating of 40,000 Kw. output unity power factor to the 60 cycle system and a rating of 38,000 Kw. unity power factor to the 25 cycle system.

The air blast transformer for the new set will be rated 18,500 KVA, which is a new record in size of air blast transformers. This transformer is provided with tap-changing switches and reactors for changing ratio underload so as to control the flow of wattless current to or from the 60 cycle system. By the addition of this feature, it is possible to obtain a large condenser capacity for power factor correction through the main induction unit at reduced loads on the set. It was found that the condenser capacity of this type of frequency converter exceeded that which would be obtained from a unity power factor synchronous machine of the same rating. This was an important factor, since the 60 cycle New York system operates at less than unity power factor.

The new 40,000 Kw. set will be equipped with a phase-shifting device on the stator of the 25 cycle machine for use when paralleling it with the present Hell Gate set. This will make it possible to divide load between the two sets in any desired proportion.

Electric Welding.

A new type of direct-current arc welding generator was developed in which the adjustment of the Welding current is obtained by shifting the brushes. This machine is rated 250 amperes, one hour 50C —200 amperes continuous, and is capable of handling a maximum welding current of 300 amperes.

The use of automatic arc welders showed a consistent increase, and new types of machines were produced for use in manufacturing.

As an indication of the results which were obtained with automatic welding machines, one manufacturer utilized them for the construction of 550-gallon underground gasoline storage tanks made of galvanized iron, each tank having three longitudinal seams 116 inches long, the material being No. 12 gauge (7/64 inch stock.)

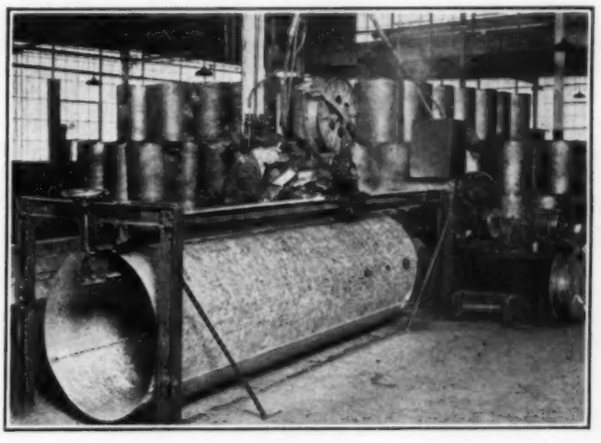

FIG. 4

In regular production, these seams were welded at an average rate of about 16½ inches per minute or a total of 7 minutes per seam. The welding current was 200 ampere with about an 18-volt arc. Previous methods of manufacturing these tanks took about 7½ hours per tank, whereas the automatic welding machine reduced this to about 5 hours. It is evident from this record that the arc welding of galvanized iron is entirely feasible, provided suitable welding electrodes are used.

YORK INSULATED WIRE WORKS

It is a matter of record that this Company and its predecessors were pioneers in the use of asbestos fibre as an electrical insulating medium for magnet wires in field and armature coils.

This insulation, due to its superior heat resisting qualities, appealed from the very beginning to the electrical engineers of the Iron and Steel Industry.

Our files are pleasing records of achievement and express unmistakably the usefulness of our products.

Motors wound with asbestos insulated wire show a longer life, lessen interruptions of service and decrease maintenance cost.

Under the Trade Name "Salamander Wire," we furnish asbestos insulated wires in either black or white finish, which have a wide application in the electrical trade.

Besides the above-mentioned standards, we have developed a new wire designated as "W. E. Salamander Wire," which is especially well suited for armature coils. We regard this type of wire superior to anything on the market. It is manufactured from carefully selected silky asbestos fibre, at degrees of heat considerably beyond the carbonizing temperature of cotton. It is absolutely free from molecular moisture and after passing through an impregnating mass, it is baked in an oven that transforms the thin layer of asbestos into a tough skin resembling rawhide. The impregnating mass and the asbestos have so well combined and are so firmly attached to the copper conductor that hammer poundings have a tendency to deform the copper without injuring the insulation.

This wire is naturally more expensive than cotton covered wire and has proved, however, most economical in its application for motor windings that are subjected to overloads with resulting heat development.

The unraveling of cotton yarn coverings are well known to and have proved a source of great annoyance to practical coil winders. This undesirable characteristic is entirely lacking in our Salamander Wires.

For the purpose of effectively removing the insulation, we recommend the use of scrapers, which we gladly furnish free of charge.

THE ROLLER-SMITH CO.

A new type of circuit breaker, the "Interlocked Trip" type. This consists essentially of a double pole, independent arm breaker, in which the two poles are closed independently, but, on an overload, will open simultaneously. Also, in the closing operation, if one pole is closed and then the other, the pole first closed will open if an overload exists.

This type of breaker is used largely for the protection of motor and feeder circuits, and makes un-

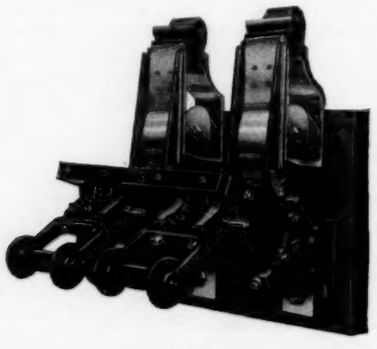

FIG. 1

necessary the use of additional knife switches and fuses.

Another new type of circuit breaker of the "Shock Proof" form of construction. Circuit breakers are frequently wanted for operation under certain conditions where there is excessive vibration or where the breakers are subjected to mechanical shocks of such intnsity as to cause undesired opening with possible serious results.

For such applications any Roller-Smith "Standard" Type circuit breaker with "Shock Proof" attachment will meet such requirement—no matter how exacting. The addition of this attachment does not alter materially the appearance, size or method of operation.

The type GSA alternating current, portable voltammeter. By employing a special form of electro-

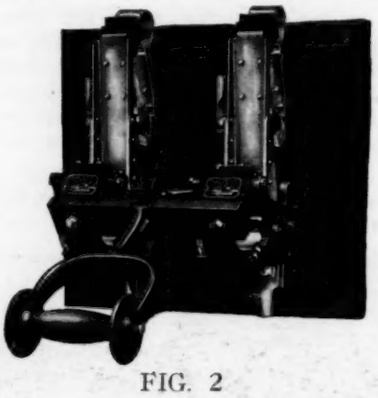

FIG. 2

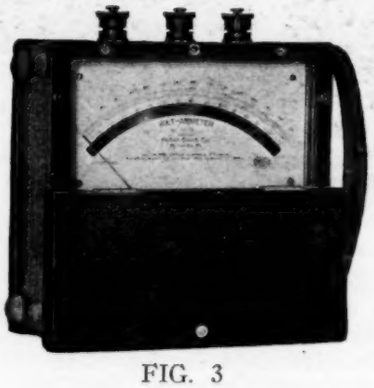

FIG. 3

magnet mechanism, it is possible to obtain any desired combination of ampere and volt ranges.

This form of mechanism also makes available double range ammeters of any combination of ranges.

THE TOOL STEEL GEAR & PINION CO.

While in many industries 1924 has been a comparatively dull year, with The Tool Steel Gear and Pinion Company, orders have kept up but slightly below our banner year in history. This has been due very largely to a development in the mill and industrial industries, and especially to the development in a few commodities.

A few years ago our company began to furnish leveller rolls for the various types of machines used in the sheet mills. Previously experiments had been tried on different types of leveller rolls, mostly in high carbon steel. It was found they wore out rather rapidly and continually needed to be dressed and ground. Tool Steel rolls in this situation have given wonderful results, lasting almost indefinitely without wearing, or even scratching. Practically every company that has given them a trial has decided to equip all of their mills with this class of material and eliminate their troubles entirely.

Another very heavy development for last year has been the forged Tool Steel crane wheels. Tests that were started a number of years ago on this commodity are now working through and developing into a large volume of business.

This year an increasingly large number of mills in buying new cranes have specified that they be equipped with Tool Steel gears, pinions and crane wheels. This has led to some very large orders for our product going direct to the crane builders on materials they were furnishing to the large steel mills, such as Jones & Laughlin, Inland, American Rolling Mill, etc.

BUSSMANN MANUFACTURING CO.

Correctness of Buss Design Confirmed

The real test of any product or design is the test of service—it is by this test that BUSS has won and continues to hold its dominant place in the fuse market.

The present design for the BUSS Ferrule Contact Type Renewable Fuses have been on the market since January, 1920. The BUSS Knife Blade type

FIG. 1

INSERT THE LINK
closed end eliminates one washer
full length cap gives large gripping surface
PUT ON CAP
SLIP WASHER ON
washer is held by bent end of link
PUT ON SECOND CAP
(note projection and recess)
and
THE FUSE IS READY FOR SERVICE

FIG. 2

Renewable Fuse was brought out in January, 1922. Month by month since each of these fuses appeared, there has been a steady increase in the volume of sales.

The simplicity of BUSS design on both types makes renewal quick and easy, practically eliminating the possibility of faulty renewal and prevents unnecessary blowouts caused by poor contact due to incorrect renewal.

Any engineer or user of fuses can obtain a fuse or Fuse Treatise giving a lot of valuable fuse information and a description of BUSS products by writing to the Bussmann Mfg. Co., of St. Louis, Mo.

SQUARE D COMPANY

A new type of switch, designed and built for use as an entrance switch, disconnect, or for installations demanding infrequent operation, has been announced by the Square D Company of Detroit, Mich.

The new type switch, which is quick break, has single throw action, and is fusible.

The new switch is built with the same care, and is subject to the same manufacturing and inspection

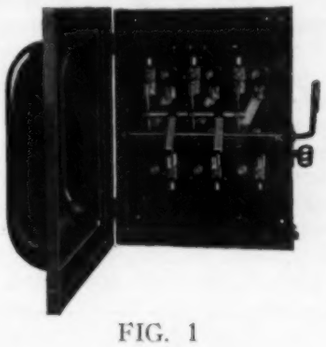

FIG. 1

standards as the remainder of the Square D line, yet its design permits it being given a low selling price.

The new type switch is now being built in the 60, 100 and 200 ampere, 3 pole, 250 volt sizes, and is known as the 46,000 line.

AMERICAN HEAT ECONOMY BUREAU, INC.

The American Heat Economy Bureau, Inc., entered on their third business year January 1, 1924, and is looking back on an extremely successful and satisfactory year.

The nature of their business of securing fuel economy in steel works brought it about that they were not materially affected by the general business depression, so that their total sales in 1924 showed a very marked increase over the 1923 sales. During the past year the company secured some of their most spectacular successes. One equipment made on all the boilers and stoves of a one-furnace blast furnace plant resulted in an increase of blast temperatures of 200 to 300 degrees and an increase of the power sales by 1,000,000 K. W. per month.

The company made a large number of these installations during the year, which have in all instances resulted in similar successes.

Special attention was given in 1924 to the development of Combustion System for heating open hearth furnaces. One installation on a coke oven, gas-fired open hearth furnace has now been in operation for four months and has given most satisfactory results. The gas consumption of this furnace is so exceptionally low that the System bids fair to become a very marked step in advance in the art of making open hearth steel.

ALLIS-CHALMERS MANUFACTURING CO.

Direct Current Generators and Motors—The important development in this line is the so-called "Frog Leg" winding for direct current armatures. This feature marks an epoch in the steady progress of generator design. The previous limitations of direct current machines due to the difficulties of commutating heavy loads or rapidly fluctuating loads are now removed and we are able to offer machines having commutating qualities far beyond anything previously built.

Main Roll Drives—We have installed and put in successful operation three mill type synchronous motors on main roll drives in steel mills. These motors are coupled to the mills without any clutch.

THE OHIO ELECTRIC & CONTROLLER COMPANY

Col. Ayers predicted 1924 would be a year of severe competition, slower production, narrower profits and increased efficiency, all of which has come to pass. Increased efficiency in material handling is typified to a marked degree by the new Ohio Magnet and Magnet Controller illustrated herewith.

FIG. 1

In the magnet average lifting capacity has been increased by at least 10 per cent, insulation of the coil has been perfected, but the simplest and at the same time the most valuable improvement lies in the rounded contour which prevents catching on obstructions and the comparatively straight side which eliminates damage to the sides of railroad cars formerly an item of considerable expense to the railroads, but generally charged back to the steel companies.

The control of Lifting Magnets is a different matter because the magnetism must be brought to zero, for instant drop of load and when the circuit is opened the fall in magnetism develops an enormous back e.m.f., resulting not only in a big, flaming destructive arc at the controller contacts, but surging back along the line to test and often break down the insulation of motors carried by the same circuit and burning out lamps connected to it.

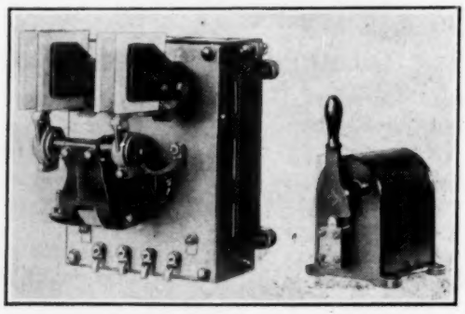

FIG. 2

The new magnet controller shown herewith has double pole break, has iron-clad resistance of ample capacity permanently connected across the magnet circuit to absorb the induced back e.m.f. or kick voltage, as many term it. This is effective, no matter how fast the controller is operated. For quick drop the master is reversed, giving the magnet a limited current in the opposite direction, reducing the magnetism to zero and dropping its load instantly.

Special features are as follows: Contact points alike, one big across the line operating coil, iron-clad resistance, arc shields hinged so they may be raised to inspect or renew the contact points, a steel cross bar which will not loosen, wear or burn, panel front hinged so one man can open it without disturbing the mounting or wiring, fire-proof insulation and small size.

We believe the features described for both magnets and controller will be appreciated as valuable 1924 improvements.

WESTINGHOUSE ELECTRIC AND MANUFACTURING CO.

Steel Mills.

The most remarkable feature of the electrification of steel mills has been the large number of orders received during this year of comparative dull times for the steel industry. This fact is a most striking indication of the economy and reliability of electric operation.

Five reversing equipments have been sold, including two large reversing blooming mills, two roughing structural mills and one finishing structural mill.

One of the greatest advances in the art was made this year, when the company placed in operation a 5000 h.p., single unit reversing mill, which received its power from two 2100 kw. generators operating in parallel. It has heretofore been considered necessary to drive one motor from a single generator, and

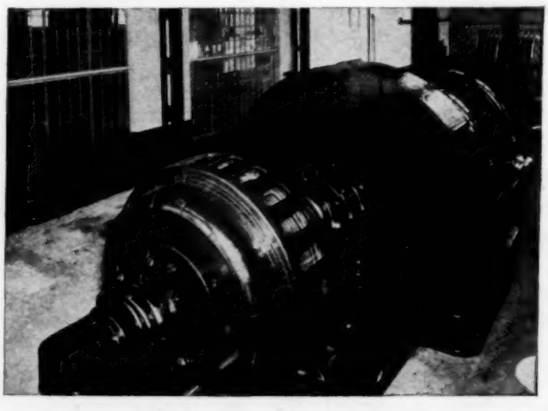

FIG. 1—*Flywheel motor generator set for supply power to 7000 H. P. blooming mill motor.*

if two motors were used, two generators were required. By this new arrangement, it is possible to design both motors and generators to best meet their operating condition, rather than to have the design determined by the number of units of which the equipment is composed. The inherent characteristics of all machines will be improved and they will perform more easily and efficiently.

A 40" and a 44" blooming mill are each being equipped with 7000 h.p. single unit motors. This constitutes the largest single unit direct current motor ever built.

A 40" blooming mill and a 48" universal plate mill have been equipped with a 7000 h.p., double unit and a 5000 h.p. single unit, respectively.

A 24" structural mill and a 22" bar mill have been changed over from steam to electric drive.

An installation has been made in Spain, consisting of a 5000 h.p., reversing blooming mill, a 3750 h.p., reversing structural mill, and a three-high plate mill, driven by a 3000 h.p., induction motor.

Work is going forward on a 6000 h.p., 98 r.p.m., wound rotor induction motor to drive a 28"-32" structural finishing mill.

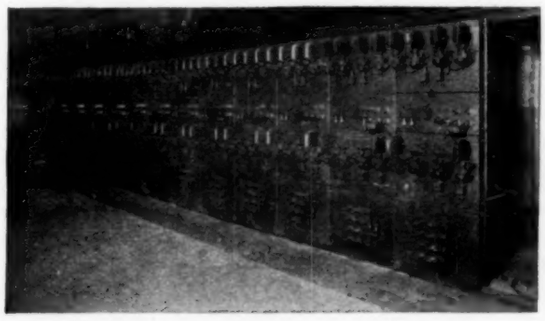

FIG. 2—*Auxiliary control board for 40-inch blooming mill*

A 500 h.p., direct current motor is being installed to operate at 155 to 500 r.p.m., at any voltage from 220 to 250. This application is for a tire mill and constitutes a speed range of 3.7 to 1, which is exceptionally high for motors of this capacity.

Several large truck type switching equipments have been installed. These are especially suitable in view of their compactness, safety features, and the quickness and ease with which they may be installed, adjusted, inspected and repaired. Only a fraction of the time is required for these operations, as compared with the time required for the standard

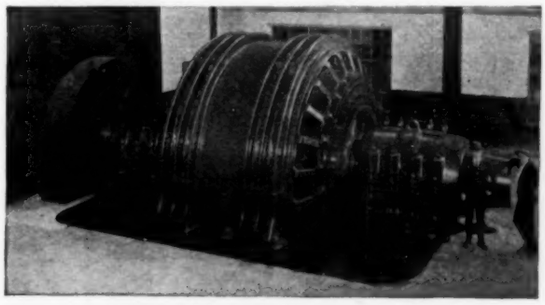

FIG. 3—*Reversing motor driving 40-inch blooming mill. Capacity 7000 H. P.*

cell type breaker. If desired, a spare breaker can be installed while making adjustments, a feature that is impractical with the former type.

A foot-operated master switch has been developed which to date has only been used for controlling reversing motors, but the application of which will undoubtedly be made in many other places. This master switch reduces the number of men required in the pulpit of a blooming mill from three to two.

A great advance has been made in the control of blooming mill auxiliaries, by the installation of two entirely separate control circuits, either of which can be used at will. Each master switch is plugged into a receptacle, and in case of trouble can quickly be replaced by a spare. A complete spare control panel is included which can be quickly transferred to any motor.

The use of automatic substations in steel mills has increased to a considerable extent. One large steel plant has changed over all its manual stations, involving five motor-generator sets and a large number of a-c. and d-c. feeders, to full automatic control. At another plant, a full automatic substation has been installed to control two 1000 kw. motor-generator sets and all d-c. and a-c. feeders. A third plant has installed three equipments for the operation of motor-generator sets and feeders.

This increase in the number of installations has been due primarily to the extreme reliability of operation, together with the operating saving that can be shown as compared with manual control to take place at the point where the power is used, thereby reducing the line losses in the feeder circuits.

The use of static condensers for power factor correction of industrial plants has increased considerably. These units permit the correction to take place at the point where the power is used, thereby reducing the line losses in the feeder circuits.

Turbines.

The company has developed and placed in successful operation several large-sized, single-flow turbines, using a multiple exhaust arrangement of the

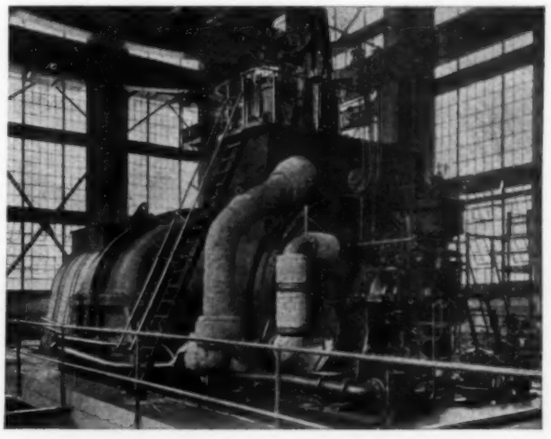

FIG. 4—*Single Flow turbine—Devon Station —Connecticut Light and Power Company*

low-pressure blading. No less than seven large public utilities are now using these turbines.

For industrial size turbines, a hydraulic type of governor has been placed in successful operation. This new form of governor has proved much more durable, more sensitive and more powerful than governors formerly used on this type of machine.

A new arrangement of steam chests for large capacity turbines has been developed. These were formerly mounted on, or attached to, the turbine cylinder, but are now bolted to the foundation with

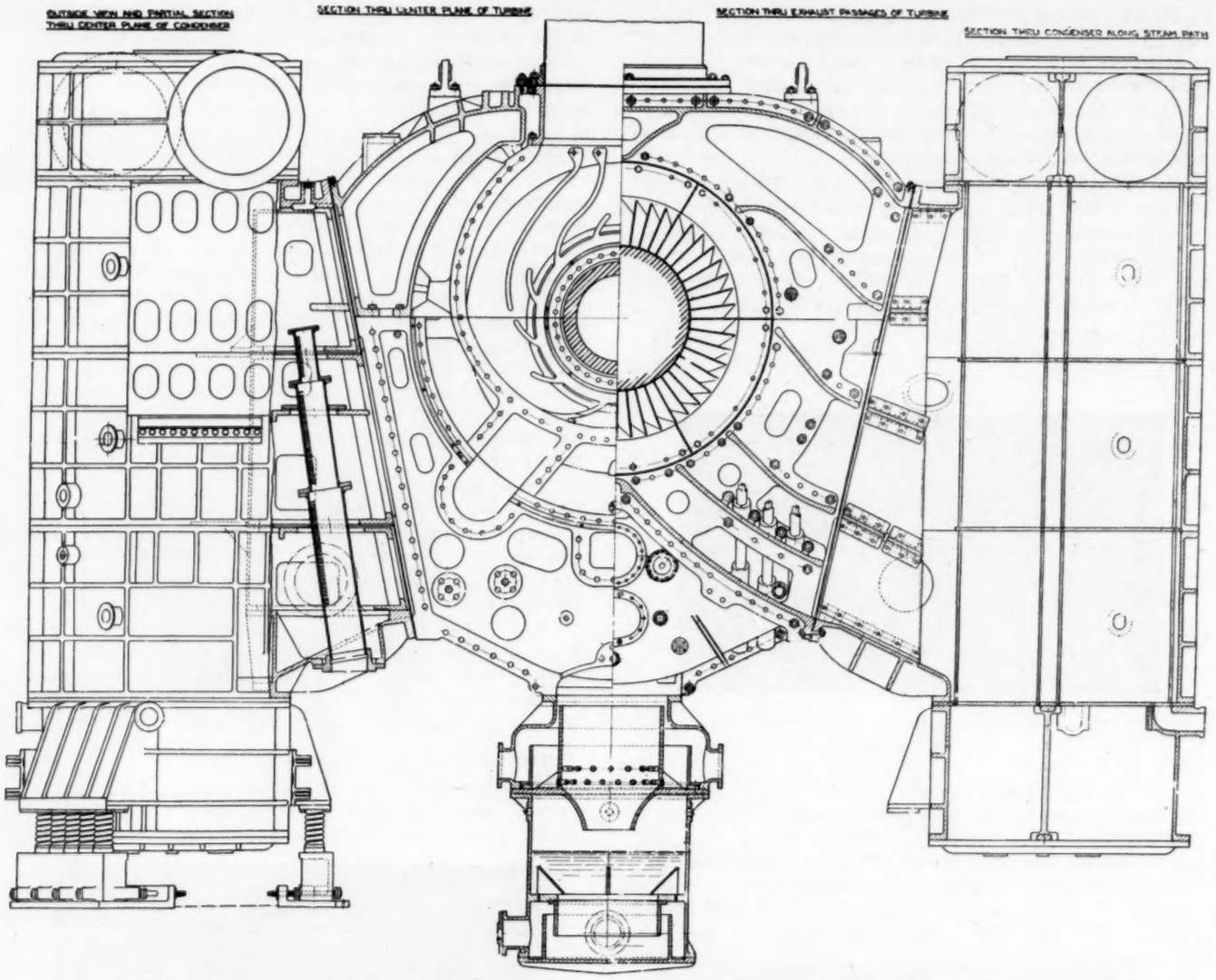
SECTION THRU CENTER PLANE OF TURBINE
SECTION THRU EXHAUST PASSAGES OF TURBINE
SECTION THRU CONDENSER ALONG STEAM PATH

FIG. 4A—*Cross sectional view of low pressure unit of* 2500 *Kw. compound turbine with condeners*

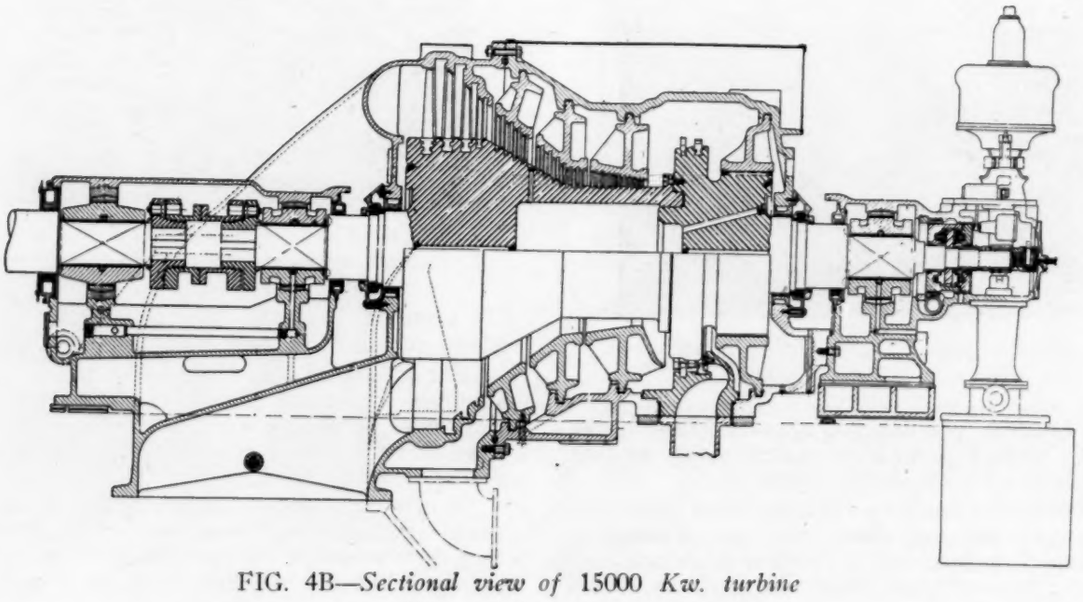

FIG. 4B—*Sectional view of* 15000 *Kw. turbine*

flexible pipe connections to the turbines. With this new arrangement, extreme flexibility in the supply line from the main header is not necessary.

The economy of the 10,000 kw. and 12,500 kw. turbines has been considerably improved by modifications made to the frame. Openings have been provided in the casting for the extraction of partially expanded steam for feed-water heating. Very marked

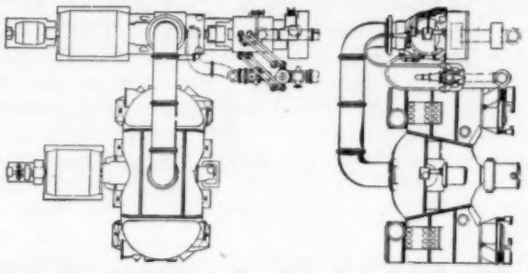

FIG. 5—*Outline of the arrangement of turbine elements and the special surface condensers for 52000 Kw., three-cylinder compound turbine unit.*

improvements in the economy of existing stations have been made by the installation of a new unit of this type arranged for the extraction of sufficient steam at several points for the purpose of heating the entire station feed-water.

A new 3,500 kw. turbine has been developed and a new 6000 kw. machine is being designed. Both of these units will operate at 3600 r.p.m. for 60-cycle systems. They will be similar in general design to that so successfully used in the 500 kw. to 3000 kw. sizes previously developed.

A 15,000 kw. machine operating at 1800 r.p.m. for 60-cycle systems has been developed. This is a single cylinder, single-flow unit, having a combination of impulse and reaction blades. It is arranged with flanged openings for the extraction of partly expanded steam from several stages of the turbine for feed-water heating purposes.

A 3-cylinder compound turbine unit with condensing equipment, having a capacity of 52,000 kw., has been installed. This unit is supplied with steam at 550 pounds pressure at 725 degrees temperature, and provision is made for reheating in the boiler to 700 degrees of the steam discharged from the high-pressure turbine in the course of its discharge from the intermediate pressure element. Shipment has also been made of the first of two 50,000 kw. cross-compound turbines. These are 2-cylinder units, each turbine driving a generator carrying one-half the total load. Coupled to the generator end of the low-pressure turbine is the exciter for both generators, while the high-pressure generator shaft drives an auxiliary generator furnishing power to the station auxiliaries.

The company has recently devised and placed in operation an equipment for "seasoning" completed turbine spindles under operating temperature conditions before final balancing. This consists of a cast-

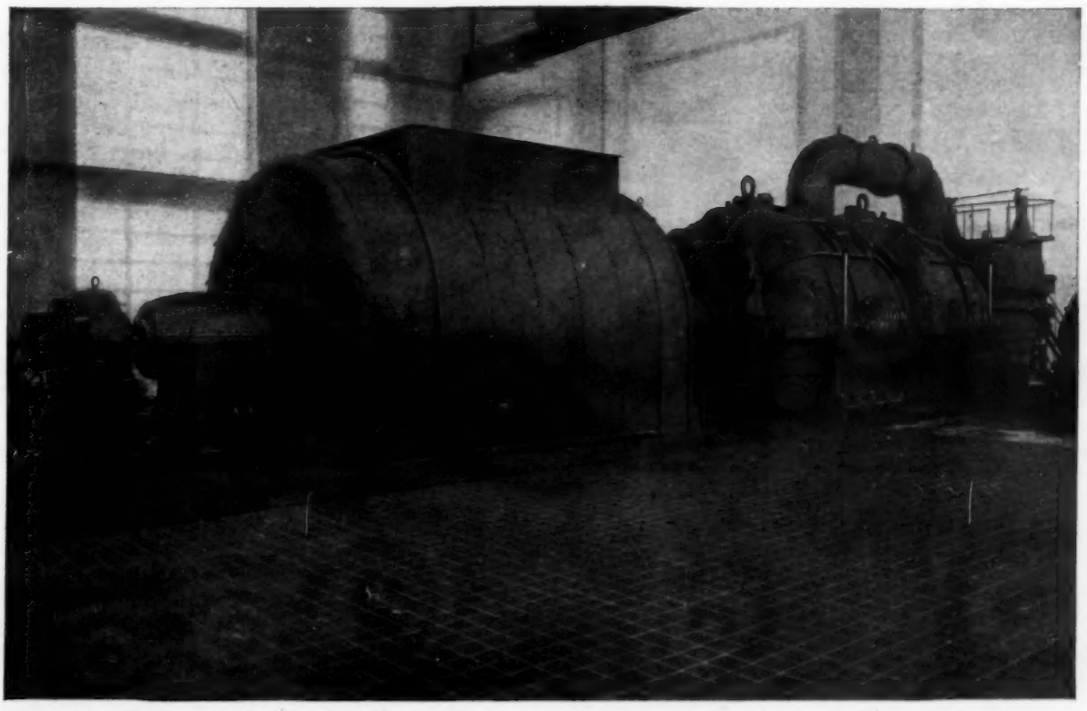

FIG. 5A—*Westinghouse 62,500 Kva. single unit generator, driven by Westinghouse steam turbine*

iron heating box in which a fully bladed spindle can be heated to 400 or 500 degrees Fahrenheit, or subjected to a vacuum while being rotated at 20% overspeed. It has been found that spindles so treated and balanced run most satisfactorily when placed in service.

Careful study and research is being given by the company's engineers to the question of the natural period of vibration of turbine blading. Experimental results so far obtained show that natural vibration frequencies of certain blade sections at room temperature, if subjected to centrifugal force, check very closely with calculated estimates. The effect of temperature on the modulus of elasticity of blading material is now the subject of an exhaustive study. The effect of centrifugal force may be accurately calculated, so that knowing the dimensions and material of any given row of blading, its natural frequency can be calculated to determine whether or not it is different from the rotating speed of the machine. Careful study of the blade designs in use show that practically all blading of the company's turbines has a natural frequency considerably above the rotating speed.

Successful trials have been witnessed of the company's geared turbine propelling machinery on the Scout Cruisers "Omaha," "Cincinnati," and "Milwaukee," and also of the company's turbine electric propelling machinery on the battleships "Colorado" and "West Virginia."

Condensers.

A special design of condenser has been brought out to serve the 52,000 kw. compound turbine mentioned previously. This condenser is built in two shells containing a total of 70,000 square feet of tube surface. It is set vertically on either side of the low-pressure turbine element and rigidly bolted to the latter, forming in effect a single structure

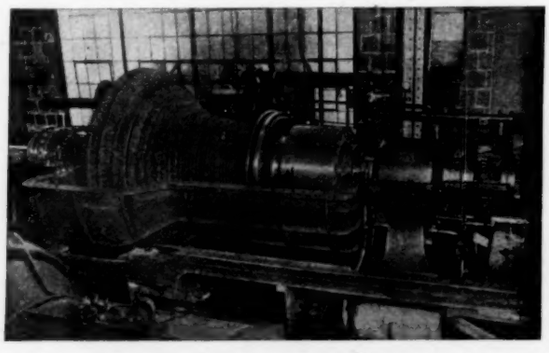

FIG. 6—*Heating chamber (with top cover removed), used for balancing turbine rotors under operating temperatures*

The arrangement of the tubes, in a vertical position, requiring the condensate to fall on and flow over the lower tube plate, causes a temperature depression of the condensate. A special hot-well or condensate heater has been provided to restore this temperature.

The condensate is drained by passages down through the tube plate and out through the side of the lower water box, where pipe connection is made with the water inlet compartment surrounding the upper part of the hot-well.

The flow of condensate to the hot-well is caused by gravity assisted by a slight pressure differential set up through a vent connection from the middle part of the hot-well to the condenser shell at a point where the vacuum is maximum.

The condensate is sprayed through nozzles into the central part of the hot-well, which is open to the exhaust casing of the turbine, and absorbs heat from the exhaust steam with which the upper part of the hot-well is filled. This is in effect a small jet condenser used as a feed-water heater. The non-condensable gas from the steam condensed in this heater is drawn through the vent connection to the main condenser, and the heated condensate is removed by a condensate pump in the usual way. Suitable baffles in the upper and lower parts of the hot-well form water seals to prevent by-passing the exhaust steam to the condensate pump or to the main condenser.

During the past year the company has made a careful analysis in the field to determine the ratio of heat transfer through the tubes in various zones of surface condensers. This study will be of material benefit in the design of more efficient condenser units.

Stokers.

A number of marked improvements have been made in the design of the company's stokers during the past year, among which are the following:

A new model underfeed stoker for use with preheated air.

A modified clinker grinder equipment for the successful handling of low grade coal.

An extra long, 33-tuyere stoker.

A device to prevent the formation of clinkers.

An effective junction of extension side-wall tuyeres with air distributing boxes.

A simple and effective secondary ram motion.

A more simple steam dump mechanism.

A careful investigation has also been made with a view to determine modifications necessary in furnace design in order to decrease furnace temperatures.

Due to the increased use of preheated air for combustion purposes, much higher temperatures on stoker parts in the wind box are experienced. This has required the modification of the tuyere box from a one-piece casting to one having retort side plates in three sections assembled with splice plates on angle-iron supports to form the unit retort. This was necessary because of the uneven strains in the castings, causing cracks and expensive replacement charges.

With the new design, the joints in each retort side provide for taking up the expansion and thus relieve any strains which might otherwise develop from an increase in the temperature of air for combustion. The sizes of castings are made more nearly uniform, and excessive expansion in any individual piece is prevented. Replacements can be made more readily and are considerably less expensive. All plates are drilled to a master jig, making all replacement parts interchangeable.

One of the effects of using preheated air for combustion is the much greater depth to which the fuel bed burns—particularly in the retort. The company's new type of construction eliminates any possibility of trouble from this cause, and makes the

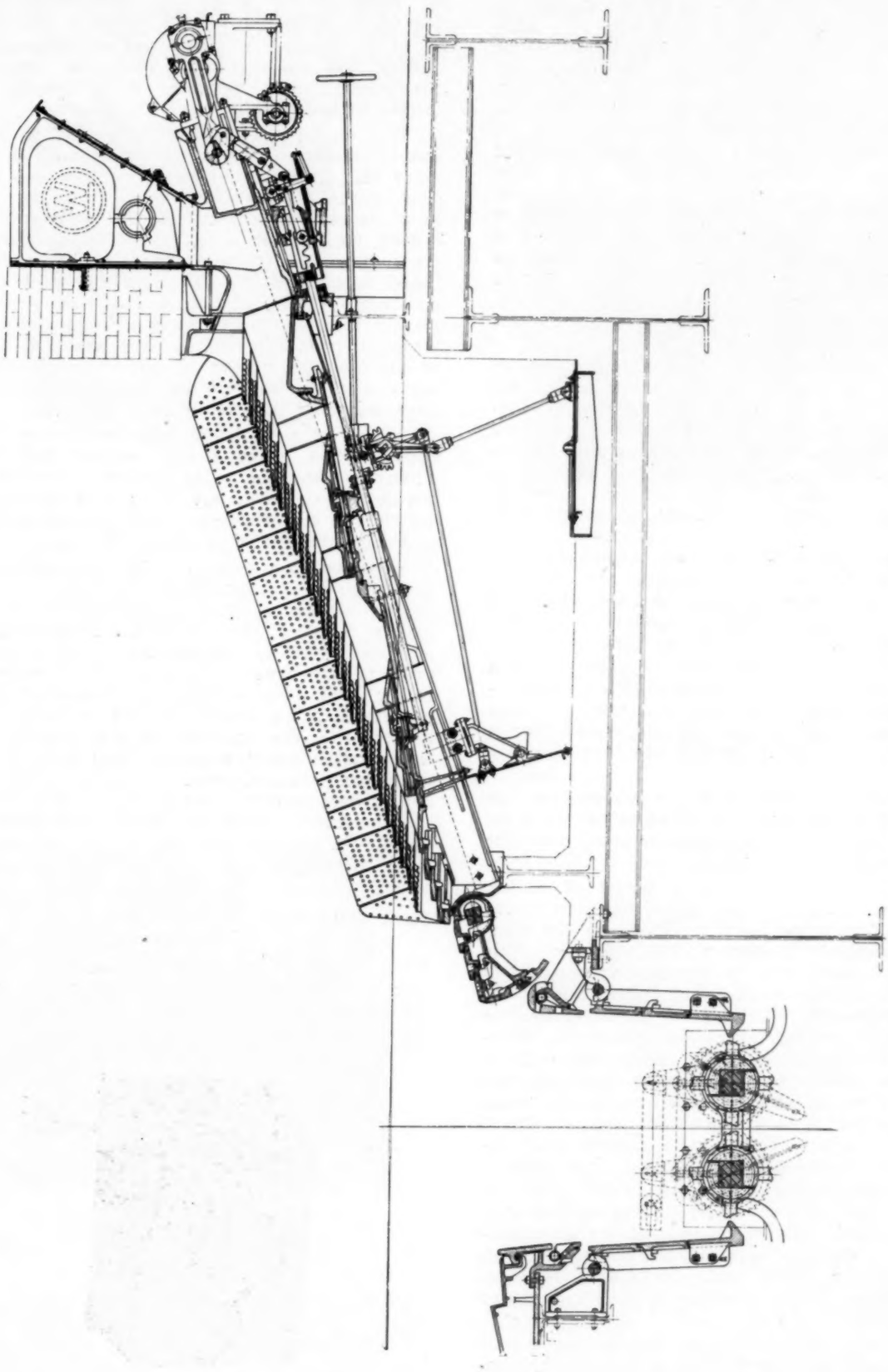

FIG. 6A—*Cross sectional view of stoker equipped with the latest type of clinker grinder*

New Model Stoker well adapted for use with preheated air.

At one time, clinker grinders were not considered suitable for low-grade coal and were used only with fuels of higher grade. Recent study and development have proved the fallacy of this belief, and clinker grinders for low-grade fuel were made with a wide clinker grinder pit of wedge shape. This design, however, did not prove successful from an operating standpoint. There was no means provided for agitation at the entrance to the pit. The width of the pit was so great that an active fuel bed could not be maintained across it, resulting in an infiltration of cold air, and causing decreased efficiency. The wedge shape of the pit prevented the free discharge of clinkers due to their wedging. Clinkers of large size would form at the lower end of the stoker without any means for dislodging them or breaking them up, causing increased trouble.

With the company's latest type of clinker grinder, the width of the pit has been very materially decreased. The sides of the pit are only slightly converging. The lower end of the stoker is provided with an extension agitating grate just at the entrance of the clinker grinding pit. This is actuated by a steam piston cylinder providing sufficient agitation, preventng the growth of clinkers to troublesome sizes.

Recent tests have shown that ,with very low-grade fuel, highly satisfactory results are obtained, and have clearly demonstrated that the successful handling of low-grade fuel is assured on stokers equipped with the company's clinker grinders.

The illustration on the previous page shows a cross-sectional view of the company's 21-tuyere double-dump grate stoker. A new stoker of the same general construction as that shown, except that it is 50% longer, having 33 tuyeres, has been added to the line.

In place of being equipped with one secondary ram per retort, it is equipped with three secondary rams per retort. It is further equipped for using a clinker grinder instead of dump grates.

Certain low-grade coals form sheets of clinker across the stoker at the lower end of the retorts, and an effective device has been developed by the company to prevent the formation of this clinker. This consists of a special retort bottom casting recessed to form a small pool for water which is fed to it slowly under low pressure. The quantity of water used is not sufficiently great to affect the combustion efficiency appreciably. However, the chilling effect of the water on the clinker at this point is most effective in disintegrating it. The disassociation of the steam thus formed, into hydrogen and oxygen, completely oxidizes the surface of the small clinkers and prevents their sticking together to form a large sheet.

A very satisfactory method has also been devised to prevent the collection of any sediment in the water piping system to this pool. This consists in the provision of a compressed air connection so that the piping and outlets may be thoroughly cleaned by a mixture of air and water under pressure.

An effective junction of the extension side-wall tuyere with the air distributing boxes, which eliminates the pocket at the front corner of the furnace, has been devised. This prevents the lodging of burning fuel at the corners of the furnace and overcomes the possibility of gases being blown out of the stoker at this point. A much better distribution of air to this part of the stoker is also obtained.

In the company's older types of stokers, the secondary ram was driven by two rods connected to the primary ram, resulting in a motion of the former in synchronism with the latter.

The secondary ram is now driven by a single rod so connected through a rocker ram to the primary ram that the motion of one opposes the motion of the other. This modification has resulted in a marked improvement in the manner of introducing fuel to the furnaces. The alternate compressing and expanding of the fuel due to the combined motion of the two rams gives a fuel bed structure of such a nature that the air is more readily forced through it. The weight of coal per stroke of primary ram has been increased 10%, due to the opposite motion of the secondary ram opening a space in front of the primary ram just as the new charge of coal comes into this space.

A new type of steam dump mechanism has been devised which is much more compact than formerly. Provision has been made for the adjusting of the position of the cylinders which was impossible under the old construction. Much greater accessibility to the various parts is also a feature.

Considerable research and development have been required to determine the features of design necessary to keep furnace temperatures within the limited range of present refractory material. This problem inevitably has become a part of the stoker problem, requiring quite as much attention as the stoker itself. The elimination of bridge walls where possible and the proper shaping of back walls, together with the exposure of the greatest possible tube surface and the radiant heat rays of the fuel to them, produced most gratifying results, reducing furnace temperatures in some cases as low as 250 degrees Fahrenheit. Many customers, in following the recommendations of the company's engineers, have been able to obtain much better installations.

Static Condensers.

Great strides have been made in this field of work, especially in the development of an inexpensive and dependable means of accurately measuring the quality of each complete unit. This has meant the development of power condensers to a point of reliability and economy heretofore only hoped for.

FIG. 7—*Static condenser enclosed in sheet steel housing*

The result has been the development of power factor correction units of very greatly reduced size and cost, but still maintaining the ruggedness and reliability first brought to static condensers by the company's earlier designs; and the development of

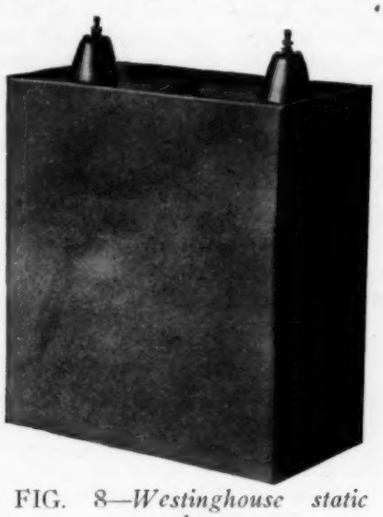

FIG. 8—*Westinghouse static condenser*

the first dependable low voltage direct connected unit which can be produced at a cost commensurate with the benefits derived from it.

It has further meant the production of a dependable, economical and large capacity unit for service on high voltage direct current.

Frequency Changers.

As a result of the careful study given to the various problems entering into the design of large machines, it has been possible to place in service a 25-60 cycle frequency changer set having an overall efficiency of 96.1% or an efficiency for each of the two machines comprising the set, of better

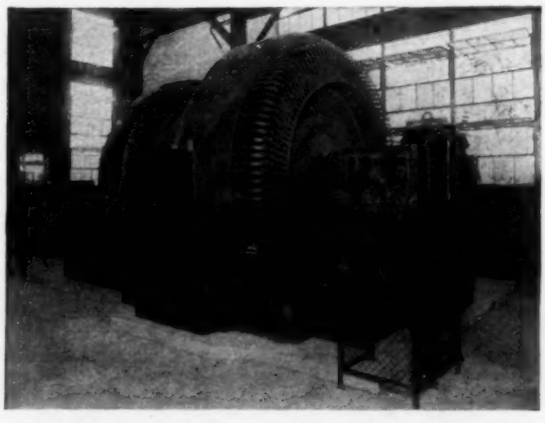

FIG. 9—3,500 *Kw. frequency changer set, showing spring method of supporting the frame*

than 98%. This is the highest efficiency that has ever been obtained in a 60-cycle motor or generator. The capacity of this unit is 35,000 kv-a.

This set is used as a power tie between a new 60-cycle station and an older 25-cycle station, in which the principal units are from four to ten years old. Because of the high efficiency of the set and the very considerable improvement in central station efficiency during the past few years, the operating company finds it more economical to supply the 25-cycle load from the 60-cycle station through this frequency changer set.

A very effective spring support has been devised for the purpose of damping out the vibrations of such machines, caused by the pulsating torque produced by the single-phase power.

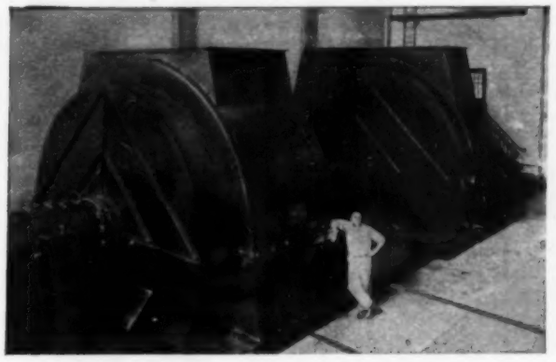

FIG. 10—35,000 *Kva.* 25-60 *cycle frequency changer set. This is the largest set ever built and has remarkably high efficiency*

In large single-phase generators used for supplying power in electrified railways, there has been some difficulty from the vibration inherent in single-phase machines. A notable advance in the design of such generators is the development of a type of spring support for the entire stator of the single-phase generator—weighing as much as 60 tons in some cases. This method of support prevents the transmission of the stator vibration to the supporting foundations and completely eliminates all vibration from the surrounding structure. This development has removed what was becoming a serious limit to the size of single-phase generators.

THE THOMPSON ELECTRIC CO.

Probably the most important development with respect to the Thompson Safety Disconnecting Hanger during 1924 has been the change of its name to the Thompson Safety Lowering Switch, as being more typical of its function.

Like other things that have forged to the front it has gone through a process of development and improvement, always with a view toward simplicity of design, rugged construction and ease of function.

The new Underslung design involves a particularly valuable improvement in that all of the moving parts except the wheel, come down to the ground when the lamp is lowered.

Among the improvements involved in the Underslung design is a provision for enclosing the line wires entering the upper member of the Lowering Switch.

Another improvement is in the provision for dead-ending the chain in the Lowering Switch.

Provision is also made for enclosing the chain in conduit. In some places this is very important, both from the standpoint of protecting the chain from moving objects and from corrosive conditions.

Some of the changes have been so inconspicuous that they, perhaps, would not be noticed by a casual inspection, but all of them tend to improve the character of the device. And while many of them could be incorporated into models already in use, yet it is, perhaps, doubtful if extensive alterations or repairs would prove to be economical, in view of the low price for the complete new model in which all of the latest improvements are incorporated.

Adequate illumination is one of the most important factors in industrial work. Like everything else, lighting equipment requires such degree of maintenance as may be necessary to enable it to properly

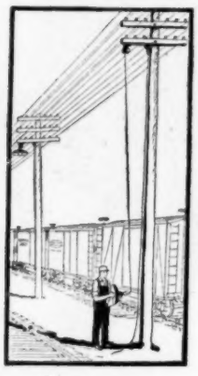

FIG. 1

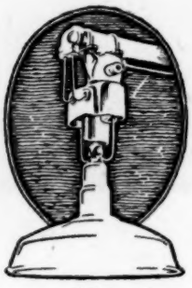

FIG. 2

perform its normal function. As lamps for general illumination naturally must be located overhead, accessibility becomes the greatest problem in their maintenance—hence the reason for the Thompson Saftey Lowering Switch, which enables all lamp maintenance work to be done on the ground, thus eliminating all climbing and electrical hazards, and making the work much more likely to be done.

It is of interest to note that the price of the Lowering Switch has not been increased by reason of the improvements made, and is very low, compared with its obvious value in the maintenance of overhead lighting equipment.

DUQUESNE LIGHT CO.

During the year just closed the Duquesne Light Company, in addition to the furnishing of electricity to a large majority of the steel mills in this district, has made available a special service to its customers. Experience has shown much good can be accomplished for the customer, as well as ourselves, by assisting in making tests to determine not only motor sizes, but kinds of motors in order to get the best operating results from a standpoint of economy.

It may not be clearly understood that this service is available in order that the Duquesne Light Company may assist any companies, engineers or consulting engineers in any capacity in which the company can be of service, and that no charge is made for this work. Adjusting power factors frequently entails no additional apparatus.

During the past year a study has been made of the power factor conditions of a great many of the steel mills in the Pittsburgh district, and real results have been obtained by adjusting the operation of the apparatus installed. The average power factors that were as low as 60 per cent have been increased to better than 90 per cent without the addition of any apparatus. In other cases, apparatus has been installed and such apparatus is now earning a handsome dividend upon its investment. Some 40,000 horse power was added to the lines of the Duquesne Light Company by steel mills and steel foundry consumers. A portion of this represents new business, but the major portion of it is merely a logical sequence of once having adopted central station service.

The Duquesne Light Company renews an invitation of long standing, not only to its customers, but to its friends of the iron and steel industry, no matter where situated, to feel free to call upon the company either to inspect any of its properties, at any time, or to obtain the benefits which many experiences in the manufacturing and distribution of power has given the company.

THE CUTTER ELECTRICAL AND MANUFACTURING CO.

In 1924 we have developed a very considerable business in the air brake alternating current: I-T-E Circuit Breaker, most of which are equipped with the well-known DALITE (direct acting time limit) features.

We have further developed our air brake rotary starting and running switches, and our double throw automatic and semi-automatic transfer switches.

In our U-RE-LITE line, we have added several new types, including the Auto U-RE-LITE SENIOR and the Auto U-RE-LITE "W," which covers capacity up to 400 amperes for direct and alternating current. These are made so that the three (3) poles open and close simultaneously; thus rendering single phasing impossible. These Auto U-RE-LITES are equipped with DALITE (direct acting time limit) features, with no voltage and shunt trip and fully enclosed in sturdy steel cases with an external operating mechanism. It is impossible for the operator to get in contact with the live parts, and he may not hold the U-RE-LITE closed against an overload condition. Means are provided for locking the case against unauthorized access, and means are also provided for locking the closing handle in the open position. Several padlocks may be applied to the open handle lockout feature, so that if more than one man is to be working on the circuit at the same time, each may apply his own lock to be used only when he is through.

The NX type U-RE-LITE is now made up to and including 1250 ampere capacity. The development on both U-RE-LITE and Auto U-RE-LITE "LL" type for direct and alternating current is finished and orders are now being accepted. U-RE-LITE has been approved by the Underwriters' Laboratories as a fire and accident prevention device, and it may be used without qualification and without fuses, which are required in series with other circuit breakers, unless under supervision.

SMITH & SERREL

One of our improvements has been the development of our High Speed Type Coupling. It is a lubricated, all-metal coupling. There is no wear on the flanges to cause expensive replacements after only a

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few years of operation. This coupling is quite easy to take apart for inspection, for cleaning of the moving parts, or for repair of the moving parts. It is intended primarily for high-speed turbines and for geared motor drives, where the misalignment is strictly limited in amount.

Our Double, Floating Ring-Type Coupling also has been improved in some detail. We have perfected and are supplying, with all new installations, a means for, centering the floating ring with respect to the ends of the flanges. It is estimated that this centering device will possibly double the life of the wearing parts of this type coupling. This centering device can also be incorporated in most of the older installations of Double Couplings.

Another improvement, which has received a very thorough tryout during the past year, is the combination Flexible-Shearing Coupling. The shearing bolts in this coupling are designed to act as a safety device at a predetermined overload. One of our customers, who has used several of these Shearing-Flexible Couplings, informs us that this coupling has acted as a safety device perhaps once a week during the last year. It is used on a strip mill and operates at a predetermined overload every time the strip curls up or when it enters the rolls too cold, in many cases saving breakage of motor, gears, etc., and expensive shutdowns.

THE FARREL FOUNDRY & MACHINE CO.

The Farrel Foundry & Machine Company, Buffalo, N. Y., have, during the past year, built a large number of herringbone gear-drive units for rolling mills. According to statistics, they have made during 1924 30 per cent of the steel mill drive units installed. All of these units are equipped with the Sykes continuous tooth herringbone gears. Most of them, apart from this feature, possesses no special features of interest. A few drives, however, are noteworthy and their characteristics should be interesting to the majority of steel mill engineers.

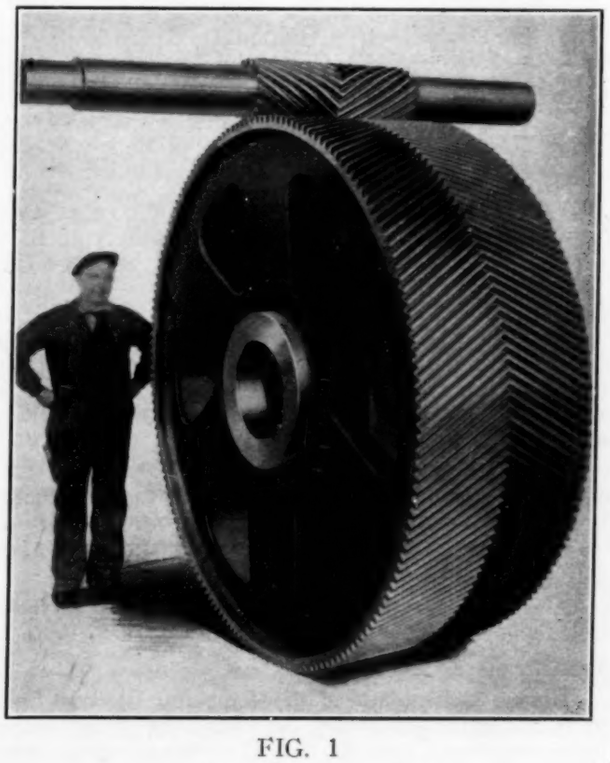

FIG. 1

Figure 1 shows a pair of Sykes gears, which have been installed in the plant of the Buffalo Bolt Company, Tonawanda, N. Y. Early in 1924 the Buffalo Bolt Company found it desirable to drive one train of mills by means of a synchronous motor in place of a direct current motor. The direct current machine was of low speed and the nearest synchronous A. C. speed was considerably higher. It was desirable, if possible, to use the same gear housing and due to the new gears having to have a higher ratio of reduction, a difficulty was encountered in obtaining a new pair of gears, giving the required ratio, because the pinion had necessarily to be of a comparatively small diameter in proportion to the power to be transmitted. As will be seen from the illustration, the difficulty was overcome by making a pinion integral with the shaft. The root diameter of the pinion is the same as the shaft diameter and in order to get sufficient tooth surface to carry the load (1000 H.P.) a wide face width was necessary. Even with the widest face width which could be accommodated in the gear housing, the gears figured out to be a little small for the duty. Therefore, this difficulty was overcome by making the pinion in a high-grade heat-treated alloy steel and the wheel in a special high carbon cast steel. Notwithstanding these special features, the drive would have been impracticable were it not for the fact that the teeth of Sykes gears are continuous. That is to say, there is no gap at the center, which, in this case. would have seriously weakened the pinion. As the gears are made it will be seen from the illustration that the teeth on the pinion actually reinforce the pinion shaft and prevent any undue deflections caused by the high tooth load. These gears have been in highly successful operation during the past nine months, and they show not the least sign of wear. They run perfectly silent. It is further interesting to note that the mill has been so seriously overloaded at times that the motor has stalled. This proves that the gears can successfully withstand the load for which they have been designed.

Another interesting rolling mill drive built by the Farrel Company is shown in Figure 2. This drive is installed in the plant of the Crucible Steel Company at their Park works, Pittsburgh. This drive is particularly noteworthy, because of the high speed and the special design necessitated by this high speed. The

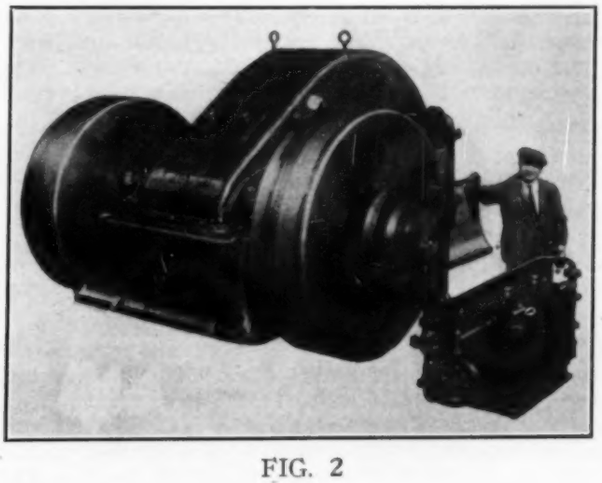

FIG. 2

bearings are force lubricated and the gear teeth are lubricated by a spray of oil. The drive is designed to transmit 700 H.P. from a Westinghouse motor with Kramer variable speed equipment, to a line of finishing mills. The motor speeds vary from 530 to 885 r.p.m. and the mill speeds from 180 to 300 r.p.m. The flywheels shown in the illustration have a stored energy capacity of 10,000 h.p. seconds at 885 r.p.m. They are 50 inches outside diameter and are made in solid steel. It will be seen from the illustration that they are exceptionally heavy. They are machined all over and accurately balanced. The gear case is of exceptionally rugged design and great pains have been taken in the design and construction to make it entirely oil tight. At one side of the gear unit the illustration shows a cast iron oil tank, which is the storage reservoir for the lubricating oil. This tank also contains two oil strainers and at each end attached to the tank is an oil pump. One of these oil pumps is a regular service pump for supplying the oil to the bearings and to the gear teeth, and it is driven from the low-speed shaft of the main drive wheel through spiral gears and a vertical shaft. This pump is connected to one of the strainers inside the tank. The other pump at the other end of the tank, and not completely visible in the illustration, is driven by a small independent motor. This pump is a spare, so that should anything happen to the other pump, the spare pump can be immediately thrown into action. It has, however, another purpose, which is equally important. It can be operated when the main gear itself is standing. Thus the whole lubrication system can be tested out without running the main motor, and furthermore, the bearings and the gear can be flushed with oil before the set is started up.

The tooth velocity at the maximum speed is 4,200 per minute. This set has been in operation about seven months, and has proved satisfactory in every way. It runs remarkably silently and free from vibration.

SANGAMO ELECTRIC CO.

The outstanding achievements of the Sangamo Electric Company during the year 1924 were the development of the Horizontal Polyphase Watthour Meter and of the 4-wire, 3-phase, 3-disk Watthour Meter.

Horiontal Polyphase Meter.

The Horizontal Polyphase Meter gives combined energy and power-factor readings. It consists of two standard Sangamo single-phase meter elements placed side by side and connected to a common differentially geared register.

FIG. 1—*Sangamo 4-wire 3-phase, 3-disk Polyphase Watthour Meter, equipped with maximum-demand attachment, cover removed*

On balanced loads the ratio of the speeds of the two disks is a measure of the power-factor. A graph on the terminal box door permits ready conversion of speed ratios into power-factor.

Practically all parts are interchangeable with those of Sangamo single-phase meters. Testing is much simpler and quicker to perform than with the usual polyphase meter, as each element is tested separately as a single-phase meter.

4-Wire, 3-Phase, 3-Disk Meter.

The 4-wire, 3-phase, 3-disk meter also uses standard single-phase meter parts. It is made in both service and switchboard types. The advantage of this meter is that it accurately measures electric energy on 4-wire, 3-phase systems even when the voltage, in addition to the current and power-factor, is unbalanced. It thus eliminates the necessity of using three separate single-phase meters, which would otherwise be required under conditions of unbalanced voltage. This meter also lends itself to the ready determination of the customers' demand by the use of the Sangamo Type H M maximum-demand attachment, which may be easily substituted for the standard Type H register.

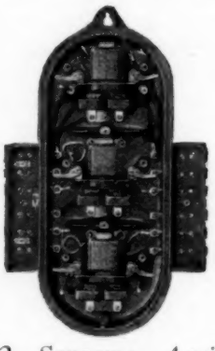

FIG. 2—*Sangamo 4 wire, 3-phase, 3-disk Polyphase Watthour cover removed*

Amperehour Meter.

A new line of Amperehour Meters, known as Type N, was developed. The outstanding features of these meters are their simplicity and a novel lower-bearing construction. The latter prevents dross formation around the pivot and jewel, enabling the meter to sustain its accuracy for long periods without attention, and making the meter more sensitive to light loads. The new bearing construction also cushions the moving element against the effects of vibration and even severe shocks.

These meters are supplied with or without contacts for automatic tapering and terminating the charge at the gassing and full points; and with or without resistors for giving the battery automatically the required excess of charge over discharge.

Various types of dials and arrangements of contacts adapt this meter to a wide variety of uses.

Transformers.

During the past year the Sangamo Electric Company has extended its line of instrument transformers by developing Types F and G current transformers,

insulated for 7,500 and 15,000 volts, respectively. In these transformers, which are rated at 50-volt-amperes, ratio and phase-angle errors have been reduced to a practically negligible quantity as compared with ordinary current transformers. Both types are offered with a single or two separate secondary circuits. The latter construction, also offered in Types C-2S and CO-2S transformers, permits the operation of auxiliary apparatus on a circuit entirely separated from the meters.

During the past year the two-stage current transformers has come into more general use, especially for accurate metering with high secondary burdens and for accurate, safe and convenient measurement of electric energy on high-voltage transmission lines and under conditions where severe short circuits are likely to occur.

WAGNER ELECTRIC CORPORATION

During the year 1924 the Fynn-Weichsel motor stepped out of the sympathetic atmosphere of the laboratory, where it was born, and made its commercial bow to American industry. It was hailed and welcomed as a noteworthy contribution.

This was the outstanding achievement in the year's work of the Wagner Corporation, but not the only notable one.

The Fynn-Weichsel motor was especially created for the purpose of correcting power-factor. It has proved to be highly successful in this, and in addition has proved to be for many uses so superior a motor to previous alternating current types that its appearance would have been an event in the history of electrical engineering on this score alone.

The growing industrial use of the Fynn-Weichsel motor during the past year has not been limited to users on the lines of the electric light and power companies. It is also becoming popular in plants maintaining their own independent power installations.

In manufacturing processes, its characteristic of absolutely uniform speed has been a great advantage in operations where the slightest change in the speed of the cutting tool affects the accuracy of the work. This uniform speed is due to the fact that it pulls quickly into synchronism and operates in synchronism over a wide load range. It has been applied in entirely new fields for motors operating at synchronous speed, because of its exceptionally high starting and pull-in torque, combined with its ability to carry momentary high over-loads and moderate overloads for comparatively long periods.

In many instances this motor has been applied to uses where synchronous motors would not have been thought suitable before the advent of the Fynn-Weichsel motor, and its use has been beneficial to plant efficiency.

As a corrector of power-factor, the Fynn-Weichsel motor has fulfilled all the expectations of its inventors and of the electric light and power industry.

Another 1924 achievement was a sheet steel case for distribution transformers that is mechanically superior to the old, heavy cast iron cases, and has none of the faults of earlier types of sheet steel cases.

It will be seen that the year 1924 has been a very busy one for us, but we feel that we have contributed several worth-while improvements in the electrical field, which will be of distinct benefit to the industry during 1925 and for many years to come.

SUNDH ELECTRIC CO., INC.

A new line of Sundh enclosed automatic starters, across the line type, for squirrel cage motors, has been developed by the Sundh Electric Co., Newark, N. J. The main part of the enclosing case is an iron bracket for wall support. It is designed so that it can straddle a standard junction box. The object is to provide means for simplifiyng and otherwise improving the installation of electrical apparatus, thereby obviating the necessity of waiting for the automatic starter before doing the wiring from the mains to the motor and push button or other pilot circuits, and to practically finish the wiring while inside construction work is going on.

In the installation of motors and control in a building, and particularly in industrial installations, it is current practice to wire the control apparatus during the course of the inside building construction, where it has been found that:

A—If great care is not taken, damage is done to the control due to pulling in of the wires in the enclosing case.

B—It collects dirt due to the construction work going on around it.

C—It very often remains a long time without attention or operation.

D—It is often exposed to the conditions of low temperature and moisture, thereby giving the control, which is the heart and brains of the installation, a bad start and trouble and expense can be expected under these conditions.

With this Sundh Combination Standard Junction Box Control it will be convenient to use the standard junction box and practically complete the wiring during the course of inside building construction before setting up the control. The junction box may be screwed conveniently in place wherever required and wires run from mains to these boxes and thence to motors and pilot controls. Then, when building is ready for operation, and everything is clean and in shape, all that is necessary is to fix the supports of the automatic control in place which straddles the junction box, remove the cover and make the required connections, thus giving the control a good start, avoiding later trouble and expense.

The main frame or bracket supports the automatic switch and overload relays. The enclosing pot is made for either one of two conditions, air ventilated or for holding oil.

The ventilated pot enclosing the electrical apparatus and the switch, is air break. It is dust and fool proof.

The oil type has the same enclosing pot as the ventilated type, but the pot may be filled with switch oil, making the automatic switch oil break. The starter then, besides being dust and fool proof, is fire and vapor proof, and is strongly recommended for steel, textile and other mills where inflammable or combustible material is flying around.

ELECTRICAL ENGINEERING AND MANUFACTURING CO.

One of our active and progressive Sales-Service organizations is the Electrical Engineering and Manufacturing Company, with headquarters in Pittsburgh. This company started some ten years ago in a small way, with only a few lines, which lines they still carry, and their expansion and growth has been steady and constant, until they now handle a large volume of business through their main offices in Pittsburgh, and branch offices in Cincinnati and Cleveland, Ohio. Backed by quality equipment of the factories they represent, and their policy of prompt and efficient "Golden Rule" service, they have made progress during the past year, as is indicated by their added facilities for handling business, and in the expansion of their field of activity, also the new products added to their various line.

The Rowan Controller Company of Baltimore whom they represent, has brought out some new equipment during 1924 for alternating current operation, which has considerable merit. The Rowan Company has in the past been making heavy duty starter and controller equipment almost exclusively for steel mill service, and the addition of the new alternating current development will open new channels in the industrial fields. This new equipment is also applicable to steel mill service, where alternating current is used.

Another concern represented by the Electrical Engineering and Manufacturing Company as Sales Managers is the Electric Power Equipment Corporation, who have made rapid strides during the year, their increasing business having necessitated the construction of a larger and more modern factory. This factory is located on North Eighteenth street, Philadelphia, Pa. This company has added a number of new features to their already broad line of high and low tension switching equipment, but bar fittings, etc. These additions include self-contained, motor-operated, remote controlled, single and group, outdoor and indoor disconnecting and pole-top switches; also the exclusive manufacture and distribution of the Bennett Surge and Lightning Arrester, which has been perfected to a very high degree of efficiency and dependability. It is particularly well suited to taking care of hard operating conditions, which often obtain around steel mills.

The Morganite Brush Company, one of the Electrical Engineering and Manufacturing Company's original accounts, have continued to expand and have added new materials to their already well-established line of carbon, graphite and metalized brushes.

The Sumet Corporation of Buffalo, makers of "Sumet" bronze bearing metals, have been very successful in increasing the use of this metal, which has proven out to be one of the best bearing metals yet produced for hard service and long wear.

Among the new products presented by the Electrical Engineering and Manufacturing Company is the steel pole of the Truscon Steel Company. This pole made in truss formation, is an exceeding strong pole, and it is easily inspected and cared for. A special steel used in the construction makes for very low depreciation and consequently a very long life. This method of construction lends itself to a wide variety of uses and makes it very applicable to uses in and around steel mills, for poles and for all kinds of supports which formerly required costly fabricated construction. There is a very wide field of uses for this pole in the construction of outdoor substations, flood lighting towers, etc.

Another of their recently-acquired accounts is that of the Rail Welding and Bonding Company, of Cleveland, O., who have developed the "Una" weld, whereby copper is welded directly to steel. Also, the "Una" dynamotors, which are manufactured in convenient sizes and portable mounting for repair shops and track-welding.

The Bell Lumber Company, of Minneapolis, have put in some new concentration yards, and up-to-date treating tanks during the year, the latest being located at Newport, Wash., which practically doubles their storage capacity in western red cedar poles. This is in addition to the Northern white cedar poles and posts carried in their various Wisconsin yards.

All indications point to a very successful year ahead for the Electrical Engineering and Manufacturing Company. Their Cleveland and Cincinnati offices have in prospect a very active program in their respective localities, and all, including their several suppliers, are looking forward to a very busy and successful year in 1925.

THE ROWAN CONTROLLER CO.

During 1924 our company has not brought out anything radically new, but have made a number of changes which, in themselves are not startling, but altogether, mean a great deal to the equipment. These changes have been largely for the purpose of strengthening weaknesses, mostly mechanical, which experience has shown could be better.

Probably the most important change has been the adoption of Lavite Arc Chutes on all our controllers, both AC and DC, which increases their life at least 20 times over. This change is not important on light jobs, but means considerable on the heavy duty jobs.

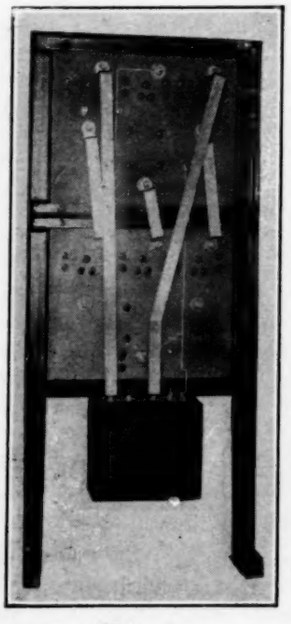

FIG. 1

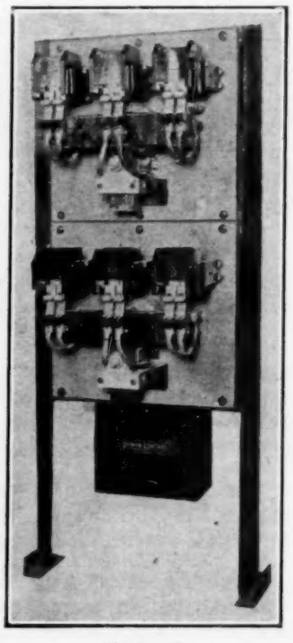

FIG. 2

A great deal of work was also accomplished in the development of larger sizes of Primary Resistance Starters for Squirrel Cage Motors, and we now have them operating satisfactorily up to and including 200 h.p., 220 volts, on such hard starting jobs as Cold Saws, etc. Tests show that this form of starting gives superior line conditions, especially on the hard

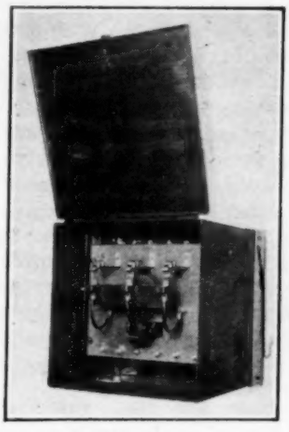

FIG. 3

FIG. 4

starting jobs and their simplicity, as this company has developed them, means greatly reduced maintenance expense.

We have also greatly improved our line of Master Switches, to be used with Reversing Controllers. The Drum Contacts are now made of phosphorus bronze, giving increased wear and renewal made easy.

We have also brought out the Primary Resistance Starter in a simplified form, which is Service Switch operated instead of Push Button operated, and it will meet the needs of those who need a reliable, simple Automatic Starter at a minimum investment.

THE ELECTRIC CONTROLLER AND MANUFACTURING CO.

During 1924 the condition of business throughout the country led to a condition where this company has done more in the way of development than it has in the way of increased business.

The business for 1924 we might call satisfactory, but not sufficient to arouse much enthusiasm.

In 1924 the E. C. & M. Company introduced a complete line of A. C. Magnetic Contactors, together with the necessary Relays and other accessories, so that complete Alternating Current Magnetic Switch Controllers for almost any kind of service are available.

For a number of years we have had on the market a line of Automatic Compensators built to take care of 110, 220, 440 or 550 volts. In 1924 a 2200-Volt Compensator was placed on the market in three sizes, the small size being able to take care of the small HPs and the largest size capable of handling several hundred HP motors. This Compensator, like the No. 1 and No. 2 Low Voltage Automatic Compensator, is entirely oil immersed and push-button operated.

Extensive studies were made regarding automatic pressure control for various duties and some important development was done along the line of preventing pulsation in the supply line interfering with accurate control.

NORMA-HOFFMANN BEARINGS CORPORATION

One of the outstanding developments of the past year or two in the iron and steel industries, as reported by the Norma-Hoffmann Bearings Corporation, is the increasing interest in and demand for anti-friction bearings in electric motors.

This concern, as manufacturers of "Norma" Precision Ball Bearings and of "Hoffmann" Precision Roller Bearings, is prepared to meet all anti-friction bearing requirements. The line of demarcation between the fields for ball and for roller bearings is not clearly defined. But it may be said in general that ball bearings have their place in motors of smaller powers and higher speeds, while roller bearings reveal their true advantages in motors of larger powers and heavier duties.

In the latter classification come not only motors of the reversing type, but also those used in crane service, on locomotives, and for general power purposes. For these motors, roller bearings are coming into increasing use, because of their larger load capacity, their large temporary overload capacity, and their ability to resist sudden shocks and jars of service. Not only are many orders being placed for new motors equipped with roller bearings, but large numbers of mill motors with plain or sleeve type bearings have been remodeled to take roller bearings. The Hoffmann Roller Bearing lends itself with particular readiness to this service, combining (as it does) the speed qualities and anti-friction efficiency of the best ball bearing, with a very much larger steady load capacity and overload ability. This bearing is of the most simple type, with cylindrical rollers having a length equal to their diameter—a ratio which has been found to give the best results in roller bearing service.

The matter of replacing sleeve bearings on existing motor equipment with roller bearings, has been given close study both by engineers of steel plants and by the manufacturers of anti-friction bearings. A number of successful and, at the same time, simple designs have been developed—one of which uses Hoffmann Roller Bearings, has been very favorably received.

In this design a Hoffmann Roller Bearing of the self-contained (two-lip) type is employed at one end of the shaft for positioning the armature, while at the other end of the shaft is a Hoffmann Bearing of separable type. This makes possible the rigid mounting of the outer rings of both bearings, thereby preventing looseness and wear and vibration—while unequal expansion of shaft and housings are taken care of by the free movement of the rollers of the separable bearing across the face of the outer ring. It will be noted that the inner ring of both bearings is pressed on the shaft against a shoulder and held by rings shrunk on the shaft.

Of course, each type of motor requires individual study in order to secure the best results where plain sleeve bearings are to be replaced by anti-friction

bearings. So successful have been the results thus far as to make safe a prediction that, within a few years, most motors in steel plants will be equipped either with ball or roller bearings—with, of course, a great saving in power, lubricant and upkeep cost.

The Norma-Hoffmann Bearings Corporation now occupies its new factory at Stamford, Conn., with larger facilities than ever before. This plant is, of course, modern in every respect, looking to quantity production of the precision standard with which the company's name has become identified. Among other features of the equipment is the use of ball and roller bearings in motors, shaft hangers, etc., to an extent probably not equaled elsewhere.

IDEAL COMMUTATOR CO.

For years it was regular power plant practice to take generators or motors off the line to true up their pitted and worn commutators, slip rings or collector rings in a lathe.

The obvious thing to do, of course, was to simply apply an abrasive stone to the surface of the rapidly-revolving commutator or ring and true it up in short order. It looked simple. But the stones that were tried didn't "pan out" so well. They wore unevenly, became hardened by heat, filled up with metal dust, or gave off so much dust themselves that they clogged up the brushes.

So the old method of truing up commutators in a lathe kept right on.

It remained for the Becker Brothers of Chicago to develop a manufactured stone of great wearing quality to handle the job. But, because engineers the world over had tried and discarded the natural stones, great difficulty was experienced getting them to give the manufactured stone a trial. It was useless to explain that this stone was made by a secret formula, that it would wear and wear, that it would not clog up, cause a "short," transmit a shock or harden and crack because of heat. Engineers refused to believe that here at last was a solution to their ancient problem.

Then the Beckers originated their famous trial offer proposition with the coupon saying: "Send me an Ideal. If I like it I'll keep it—if I don't I'll return it—" the coupon that's about as familiar to power plant men as "Ivory soap floats" or "Postum—there's a reason."

For seven or eight years the number of returned coupons increasd month by month with uncanny regularity. The coupon never failed to tickle the power plant men, somehow, and rare, indeed, were the returned stones, according to Mr. J. W. Becker. Then, to his dismay, coupon returns commenced to drop off. For a month, two, four months, fewer and fewer were sent in. And stranger still, the business showed its regular healthy, steady increase. Very peculiar. Then the reason dawned on the Beckers. They had just about done the thing that experts and analyists said was impossible—they had attained just about 100% distribution—they covered their field like a tent—the reason so few coupons came in was because there were so very few power plant men who weren't acquainted with their stones!

A truly remarkable example of how a good product, ideally suited to its purpose, made itself practically standard in the short space of ten years altogether.

AUTOMATIC RECLOSING CIRCUIT BREAKER CO.

It was just about 11 years ago that the automatic control of power circuits was put forward as a matter of economic importance, especially where such power circuits were subject to frequent interruptions. Since then, this subject has received increased attention each year, until today in certain industries the automatic control of power circuits is the accepted method of efficient operation. That this is not the case in all industries, is probably because the advantages of automatic circuit control are not equally apparent in all cases. Where the advantages are doubtful it is perhaps a natural reluctance to use automatic apparatus where manual apparatus seems to be sufficient.

There has been, however, in the past year two distinct developments in automatic circuit control. The first and perhaps most interesting of these, because it is an application where interruptions are extremely infrequent and yet where the advantages of automatic

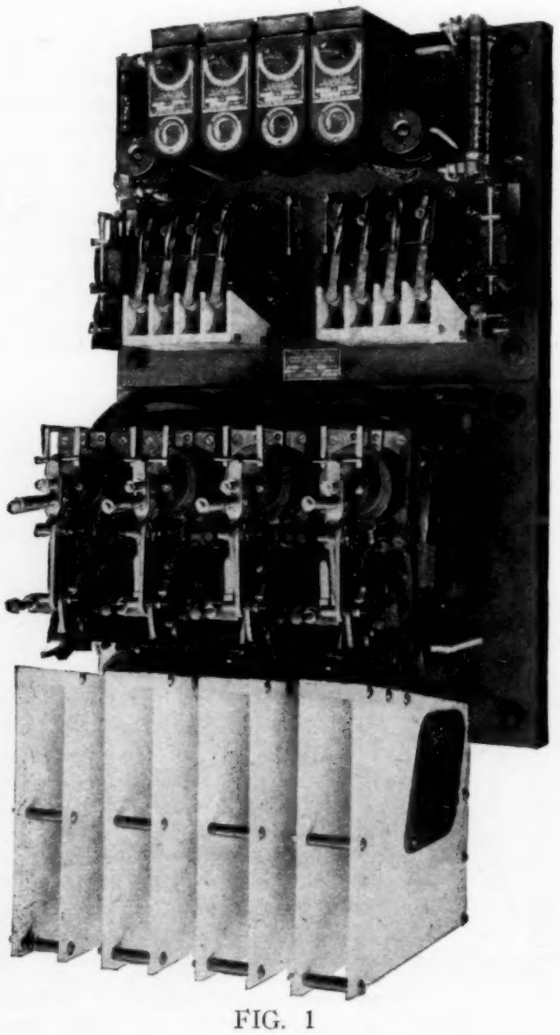

FIG. 1

circuit control are recognized, is an installation made in a sub-station of one of the largest electric light and power companies in the country. This sub-station converts alternating current to direct current and supplies an Edison 3-wire system in a downtown section of one of our large cities. The significant thing about this application is that interruptions to service are very infrequent, but because it is important when such interruptions do occur to restore service most expediently and with the least delay, Automatic Circuit Reclosing Circuit Breakers have been installed. There are 24 feeders out of this station and all of these have been equipped with circuit breakers of this type. These circuit breakers of course, open on overload or short-circuit in the usual manner and also on excessive cable temperature. They may be adjusted to reclose when the conditions of the load circuit are such that an excessive current will not flow upon reclosure of the breaker, this adjustment being calibrated to indicate the number of amperes which will flow upon reclosure of the breaker, or they may be adjusted to reclose regardless of load conditions a given number of times and then lock out permanently if they fail to stay closed. Or they may be adjusted to lock out permanently after a given length of time if load conditions do not permit their reclosure. They are also provided with remote control in addition to the automatic control.

A second development in automatic circuit control is the adaptation of an operating handle to an Automatic Reclosing Circuit Breaker which makes it possible to operate the breaker manually if for any reason manual operation is desired or becomes necessary. This development has been made because in some cases there has been a reluctance to use Automatic Reclosing Circuit Breakers which depended entirely on the maintained operativeness of coils and resistance units. While the failure of coils and resistance units is to be no more expected with Automatic Reclosing Circuit Breakers than with Automatic Starters and motor control apparatus, it would be folly to deny that such failures may and do occur occasionally. Under such circumstances, it is at least desirable to have a means for operating the circuit breaker manually. It is believed that this provision should lead to a more general acceptance of the advantages of automatic circuit control.

HYATT ROLLER BEARING CO.

Anti-friction bearings have been operating successfully in electric motors for many years, but it is only in the past eighteen months that the motor user has awakened to the many operating and money-saving advantages they inherently carry with them. This awakening is undoubtedly due to the activities of the Association of Iron and Steel Electrical Engineers.

Of the many motors which pass through the Electric Shop monthly, the majority are there due to bearings. The large part of this expense is traced directly to the absence of lubrication in the bearing itself, resulting in low bearings and rubbing of pole pieces, and the presence of oil or grease on the windings, causing burned-out armatures.

The Hyatt new series bearing was designed for electric motor service. This bearing is made to the standard dimensions of 200, 300 and 400 Series. The bearing is designed to have ample capacity for the motor whose shaft size it will fit, with a large margin of safety for the shocks, over-loads and abuse, which are characteristic of electric motor service.

A typical Hyatt mill motor application is shown in the illustration. In this design the motor frame is not altered in any way. The Hyatt bearing and housing fit in the space used by the sleeve bearing.

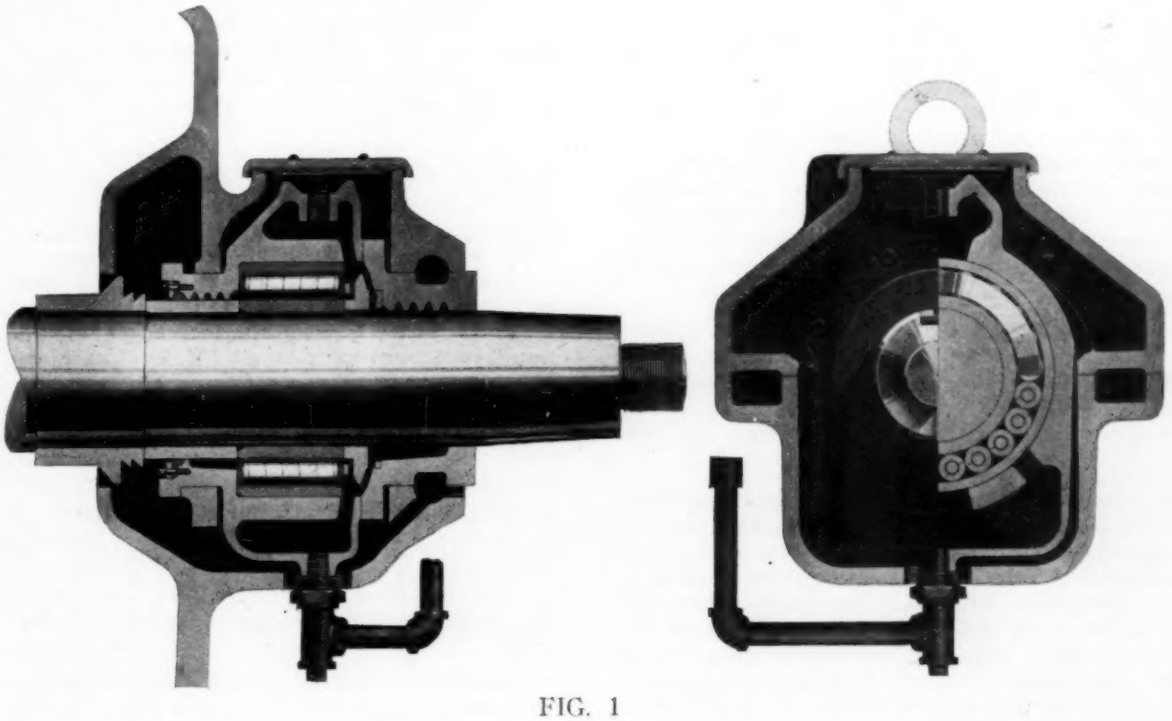

FIG. 1

It is to be noted that in this design the straight cylindrical construction of the Hyatt bearing and parts permit a lengthwise variation in the shaft and frame without necessitating any adjustment whatever of the bearings. This feature allows for variations in machine work, for any desired amount of end float of the armature, and for an equal expansion of the shaft and frame, due to its temperature changes.

In the mill type motor the rotor and bearings must be easily removable from the frame. In the Hyatt equipped motor, this process is identical with the methods used with existing sleeve bearing motors. After the rotor is lifted from the frame, the Hyatt housing can be slipped off the shaft in the same manner as sleeve bearings, without the use of even a wrench. In the reassembly of the rotor, the bearings can be slid into place by any mechanic. The millwright gang changing the armature in this mill motor, would handle it the same as any other sleeve bearing motor and there is no need for any special treatment of any kind.

The condition of mill motor operation leads us to believe that oil lubrication is preferable to grease. Over-lubrication is probably the largest single cause for motor troubles, and it can be more readily avoided with oil than grease, due to the fact that oil can be poured and will establish its own level.

In the design illustrated, it will be noted that the established oil level is at the center of the bottom roller and well below the shaft line. Any lubricant which gets to the shaft is wiped from it by the oil grooves in the housing and free return to the oil well is allowed by an oil passage leading from the wiping grooves to the oil well.

MAGNETIC MANUFACTURING CO.

Many years have been given to research work and thousands of dollars have been spent in an effort to perfect satisfactory equipment for the separation of concentration of low grade magnetite iron ore. During this period every avenue has been searched, every conceivable means tried. A solution to this problem is deemed of great importance, due to the fact that high grade hematite ores are not so plentiful, and it is only a question of time, and this time is not very distant, when the magnetite iron ore bodies will have to be depended upon for our iron supply.

There being vast bodies of this oré the problem of concentration is indeed a very interesting and necessary one. Many of the best minds in the country have been at work on this problem for some time. Concentrating equipment of one kind or another has been tried with a greater or lesser degree of success.

An important phase of this problem, and one which has perhaps spurred on to a greater effort, is the fact that laboratory tests on various devices have proven conclusively that there is a solution to the problem on a large production basis. It has been found that owing to the slight difference in specific gravity between these ores and their associated gangue, that concentration cannot be properly effected by any of the usual specific gravity processes.

Magnetic separation has been recognized as the logical means to this end. Many types and styles of Magnetic Separators have been tried with varying degrees of success. Due to the solicious nature of most of these great bodies of ore, it has been found necessary to employ the wet process, water being used to assist in the separation, as by this means the gangue can be freed from the magnetite while the magnetite is being agitated by the magnet.

The possibility of success on a large production basis depends upon the agitation of the magnetite, the power of the magnet and the ability to move the material quickly through the magnetic field while the water washes the gangue free and clean from the ore.

New and novel features are embodied in our new Separator. This new machine handles magnetite iron ore and other similar materials in large capacities. The principal feature of this machine, which is new and novel, is the design and construction of the magnet. A very considerable burden of iron is held by the power of the magnet against the surface of the vanner edged conveyor belt. The lines of the magnet are easily traced by the position of the fine iron particles.

The material to be treated is spouted onto the belt either in the dry or wet state, preferably wet. The feed strikes the belt just above the lowr spray pipe. The spray pipes are arranged so that the volume of water is sufficient to thoroughly wash the material. As the material is fed onto the conveyor belt it immediately comes under the influence of the powerful magnet located directly underneath the belt. The magnetite is held against the surface of the belt and moves slowly in an upward direction, while the water moves in a downward direction. The iron in passing from pole to pole of the magnet turns over, which allows the water to flow freely through the same. Added to this is the fact that the iron particles move sideways on the conveyor belt, first in one direction and then in another as it passes from pole to pole, thus imparting a gigging action to the ore. The magnetic material as it moves with the belt in the upward direction is thus agitated many times in different directions, and turns over a number of times in passing the poles of the magnet, thus allowing the water to wash the material very thoroughly before it passes out of the magnetic field. In order to effect an automatic discharge of the magnetic material the magnet has been designed so as to allow the magnetic material to gradually move out of the magnetic field, and as it moves out of this field it mats to the surface of the conveyor belt until it reaches the discharge point, where it is washed off by the means of a spray of water. The magnetic material is discharged at a point just below the lower surface of the pulley at the top of the machine into a receiving hopper. The non-magnetic material is washed off at the lower surface of the belt into receiving hopper at the extreme lower end of the machine.

Materials can be treated by this type of concentration ranging in size from approximately ¼-in. to extreme fines. To obtain the very best results the material should be properly sized before treatment.

The separators are wound to operate on direct current voltages up to 250 volts d.c. They are sup-

plied with switch panel mounted on the machine with the necessary control apparatus, so that the strength of the magnet can be increased or decreased to suit the conditions and to effect a satisfactory separation.

This new type of concentrator has been designed and built by the Magnetic Manufacturing Company of Milwaukee, Wis., for the South Manchurian Railway, a subsidiary of the Japanese government.

THE MARTINDALE ELECTRIC CO.

The Martindale Electric Co., 11729 Detroit Ave., Cleveland, O., has improved their Imperial Undercutter, illustrated in Fig. 1, by the addition of a flexible shaft (Fig. 2.) driven by a ¼ H.P. motor. motor.

This new shaft takes the place of the former telescoping shaft and is a big improvement because of its freedom from vibration and the larger number of commutator slots that may undercut before the armature is rotated.

The essential features of the Imperial Undercutter are:

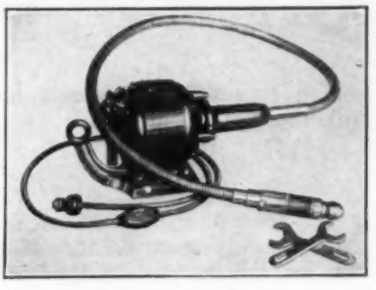

FIG. 2

Other improvements and developments during 1924 reported by the Martindale Electric Co. follow:

Imperial Commutator Cement, a high-grade cement put up ready for instant use in air tight cans.

Commulac, an Insulating liquid for painting commutator slots on undercut commutators, to prevent deterioration of the mica and short circuits from oil or dirt. It dries glass hard overnight, so that the excess Commulac may be stoned or sanded from the surface of the commutator without peeling the film of Commulac from the edges of the slot.

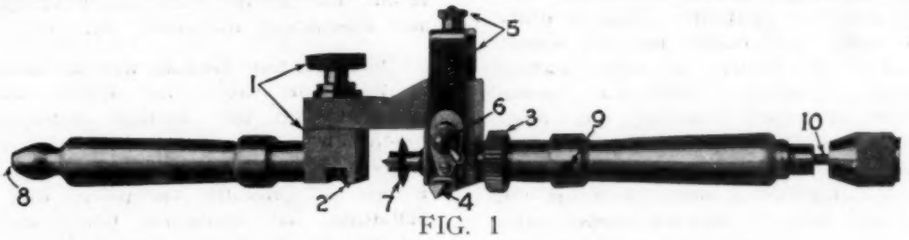

FIG. 1

1. Sliding Block with lock-nut to set slot guide to the approximate position.

2. Slot guide to ride in an adjacent slot.

3. Micrometer Screw Adjustment, to set the cutter in the exact center of the mica.

4. "V" Shaped guide to regulate the depth of the slot.

5. Depth Gauge Screws to raise or lower the "V" Shaped Guide to change the depth of the slot.

6. Depth Gauge Lock-nut to lock "V" Shaped Guide in place.

7. "V" Shaped Milling Cutter, which cuts a "V" shaped slot and will do the work of at least six of the ordinary commutator slotting saws now in use on other machines. Finished in two diameters, No. 1 for commutators 10 in. or less in diameter, No. 2 for commutators over 10 in. in diameter.

8. Hollow Handle for compressed air line. Note that the screw and nut holding the cutter on the shaft is cone shaped and at the proper angle to deflect the air to the edge of the cutter. This blows the mica away from in front of the saw and enables the operator to see his work clearly at all times.

9. Oil chamber, the only place the machine ever needs to be oiled.

10. Driving Shaft passes through a bronze sleeve in the right-hand handle.

It does not crumble or soften under even moderately severe sparking and heating.

Imperial Blow-er Clean, a portable electric blower with suction attachments to operate either as a blower or vacuum cleaner for cleaning motors, generators, switchboards, resistance grids, stock bins, work benches, etc.

Special "V" shaped milling cutter for use with the Aurand Commutator Slotter. It is made from High Speed Steel, cuts the desirable "V" shaped slot, and will outlast at least 6 or 8 of the square slot saws.

KEYSTONE LUBRICATING CO.

The year 1924 has seen some very rapid strides in the development of lubricating systems, as applied to the Steel Industry. One of the greatest developments has been the Keystone Safety Lubricator. The lubricators are made in ½, 1, 4, 8 and 16-pound capacities. A size for every conceivable piece of steel mill machinery. The 16-pound size, which is used on exceptionally large jobs, is the very latest development. Another very important development has been the Keystone Pressure Reduction Grease Valve. This was a necessary development to insure the proper amount of grease getting to the bearing. It is a decided improvement in valve construction for service in grease usage, where grease

is under varying pressures and where valves require "fineness" in adjustment. The marked graduations on the side of the valve enable the operator to set the valve to feed a supply of grease suitable and adequate for bearing lubrication. The valve plug has a screw driver slot for the purpose of adjustment. The valve plug is finely ground and will resist easy adjustment. This feature is purposely intended so that it will resist alteration in adjustment by the average small screw driver by unauthorized persons.

One of the most common installations is on the overhead traveling cranes. Two lubricators are used on most installations. One lubricator for the bridge and another for the trolley. Bridge lubricator is mounted near ladder or stairway from crane cab or at any other safe and convenient spot. An 1½-inch header line is run from the lubricator, which is either an eight or four-pound capacity, and ⅜ or ½-inch leads are taken off the header for the various bridge bearings. Keystone Pressure Reduction Grease Valves are put in at bearings and are adjusted so that just enough grease is forced into every bearing each time the wheel is turned on the lubricator. The crane cellar boxes are taken by piping to the boxes and forcing grease into the boxes, which have been packed with Keystone Wool Yarn Elastic (Wool Waste with a certain percentage of horse hair in it to make it resilient.) Trolley lubricator is mounted on trolley and header line run around trolley and leads taken off header for every bearing on trolley. Keystone Pressure Reduction Grease Valves are put in at each bearing and properly adjusted. In some instances booster cups are installed on bearings. Grease is forced into the cups from lubricator, compresses a spring at top of cup and grease is then fed into the bearing continuously. Tell-tale on cups indicates when cups need refilling. In case of ore bridges, converter cups are often used, these cups come in two and four-pound capacities. Installation of lubricator can be made by any pipe fitter department.

Lubricator installations on cranes have proven very satisfactory for many reasons—the crane can be lubricated in a fraction of the time taken formerly. Greater grease economy, because it eliminates the excessively wasteful method of filling individual grease cups. Positive lubrication in every kind of weather, when Keystone Grease is used Last, but not least, it makes the greasing period the safest instead of the most hazardous period in the craneman's day. It eliminates his climbing over the crane, carrying a grease bucket over slippery or ice-covered cranes. It eliminates the danger of falling grease cups on workmen below.

Installations of the Keystone Safety Lubricator have been made or are pending on practically every piece of steel mill equipment from overhead traveling cranes to cooling beds, including blast furnace mechanism, Medart Straighteners, shears, slag crushers, strip mill drives, lineshafting, coal crushers, etc. Many notable installations have been made, among them a Loading Tower Bucket and Hoist Conveyors. On this installation a four-pound lubricator was used and approximately 172 bearings are lubricated, including all driving gear bearings, all hopper and turn table bearings and an 82-foot conveyor belt. Also, a one-pound lubricator is used to lubricate eight bearings on the grab bucket trolley. Cups were formerly turned down on this job every twelve hours. Took approximately two hours to do this, now the Tower is lubricated in two minutes at a tremendous saving in grease.

Many of these installations in the steel industry have been supervised by our mechanical department, which is available for surveys, or they will assist in the planning of any installation or proposed installation. This service is gratis.

R. D. NUTTALL CO.

The R. D. Nuttall Company reports that one of the most gratifying "Developments of 1924" was the increasing interest in, and inquiry for details, records, performance data, etc., in connection with Nuttall Helical Gears and Nuttall Flexible Couplings, which are illustrated in the advertising section of this issue.

The adoption of Helical Gears has probably been more rapid than the adoption of any other relatively new product. As this article is written for engineers, it is unnecessary to enlarge upon the advantages of these gears, and when they are mentioned as a relatively new product the fact is not overlooked that Helical Gears are probably nearly as old as spur gears, but their production in a commercial way is relatively recent, due to the fact that development of practical and economical machinery was slow.

The fact that Helicals may be used to replace spurs, in the same ratios and speeds, and on the same centers, and the further well-proven fact that machinery driven by Helicals will outlive machinery driven by spurs, due to absence of vibration, is now so generally recognized that Helical gear installations are increasing daily, and while it might not be safe to predict that Helicals will entirely supplant spurs, it is easily within the possibilities, and would occasion no surprise to anyone familiar with the trend of the demand.

Another almost radical development is the practically universal demand that steel gears be heat treated. This is entirely logical, because the various Nuttall treatments impart anywhere from two or three to ten times the wearing life of untreated steel, but the most popular medium seems to have been struck in the Nuttall BP treatment, which imparts to ordinary medium carbon steel better than four times the life of untreated steel, having reference to breakage as well as wear. Case hardening will impart approximately ten times the normal life, so far as wear is concerned, but with such drastic treatment it is not possible to give the guarantees against chipping or breaking that can be given on steel BP treated.

As an experiment, pieces of tool steel up to ½ foot square were fed in between the gear and pinion of a railway motor at a local plant, with no damage to the BP gearing, but the other results were to bend the armature shaft and break the bolts securing the bearing cap, so it is pretty well established that BP gearing can be relied upon not only for long wearing life, but under extreme conditions of shock, varying load, unusual strains, etc.

The Nuttall Flexible Couplings, illustrated in the advertising section, cover the coupling field completely, from loads as small as 10 H.P. to loads as high as 4875 H.P., and also cover practically the whole

field of design and service requirements. Type A is a rubber buffer coupling which will operate successfully under unusual misalignment of shafts and withstand unusual shocks. Type B is a rugged, cast steel, spring buffer coupling for heaviest duty and can be made up to 78" O.D., 18½" bore. Type C is an all-enclosed, spring buffer coupling, truly machined outside and with no projections of any sort, so that it has become known as the "Safety First" coupling.

The Nuttall Company has very complete literature on its Helical gears, on all its heat treating processes and on its couplings, and will take great pleasure in supplying it to anyone interested.

LUDWIG HOMMEL & CO.

In June, 1924, Ludwig Hommel & Co. moved into their new home at 929 Penn avenue. Starting in 1907 with a small office, Ludwig Hommel has built a business that today requires an entire six-story and basement building.

This company acts as Pittsburgh District Manager for the Wagner Electric Corporation of St. Louis, Mo., and as Pittsburgh Sales Agents for the Sangamo Electric Company, Springfield, Ill. They also represent the Economy Electric Devices Co., of Chicago, Ill.; W. D. Crumpton & Co., of New York City, and the States Company of Hartford, Conn., the last-mentioned company manufacturing a well-known line of meter testing apparatus.

During 1924, the Fynn Weichsel Motor, brought out by the Wagner Electric Corporation late in 1923, gained wide approval among central stations and engineers as a motor that corrects power factor, as well as proving its reliability as a motor. The Wagner Electric Corporation also improved its entire line of power and distribution transformers, bringing out a new line of steel case transformers in distribution sizes.

The Sangamo Electric Company contributed a number of achievements to the metering art during 1924. One of the most interesting was their new Distant Dial, a device which has been perfected for both alternating and direct current service, which makes possible the reading of the registration of watthour meters a number of miles from the point at which the power is being measured. For example, a plant engineer may have before him in his office distant dials to read the current consumption being measured by meters on his switchboard several miles away.

This distant dial can also be used to totalize the registration of several meters located at different points several miles apart. The main meters do not necessarily have to be of the same ampere capacity, and both A.C. and D.C. meters may be totalized on the one distant dial. This makes the distant dial particularly useful where power is supplied from several substations some distance apart, and the superintendent desires to know the total power being used.

During 1924 W. D. Crumpton & Co. improved the Baker Transformer Temperature Signal. While this device was designed primarily for indicating maximum temperature attained and the temperature at time of reading of the oil in transformers, it can also be used to indicate critical or dangerous temperatures in coal piles, grain storage bins, etc. A contact can be arranged in the signal to sound an alarm at a convenient place when the temperature within the coal storage or grain storage bin approaches a dangerous point.

The Economy Electric Devices Company have improved their Aluminum Field Coil, which has met great success in the street railway motor field. A film of aluminum oxide is used as insulation between adjacent conductors. These coils should prove a real economy on D.C. Crane Motors, Lifting Magnets, etc.

In addition to carrying stocks of Wagner motors and transformers, and Sangamo Watthour Meters, Ludwig Hommel & Co. also carry large stocks of most approved types of radio apparatus and supplies, as well as a representative upon line of Westinghouse appliances and lamps for whom they act as jobbers.

The building they now occupy has been entirely equipped with the most modern devices, such as dumb elevator, pneumatic tubes, package chutes, etc., that would improve the service Ludwig Hommel & Co. aim to give, and a visit to their establishment will prove most interesting.

CHICAGO FUSE MANUFACTURING CO.

A new 96-page catalog has just been published by the Chicago Fuse Manufacturing Co. of Chicago, and it contains information that should be in the hands of everyone interested in electrical products. It shows illustrations of Union Renewable and Non-Renewable Fuses, Gem Enclosed Fuses and Mica Top Block Fuses, Union Links, Fuse Wire and Strip, Union Cut-out Bases, Cutout Fittings, Union Automobile Fuses and Automobile Blocks, Union Cutlet Boxes and Covers, Concrete Boxes, Conduit Boxes, Set-Up Boxes, Ceiling Boxes, Gem Switch Boxes, Union Conduit Fittings, etc. Also gives sizes, prices and information of every kind that might be desired by buyers of such products.

We understand a copy of this handsome catalog will be sent to anyone writing for same.

ROLLWAY BEARING CO.

Reviewing the year 1924, this company's outstanding accomplishment in relation to the steel industry was the application of its product to the complete electric motor equipment of three new mills, two of which are already in operation, the third to go in service early in 1925; the individual units in many cases being the largest ever equipped with anti-friction bearings and each installation in the aggregate constituting the largest of its kind ever made.

We term this an accomplishment, as accomplishments are established facts, and while such are usually the logical sequence of properly co-ordinated periods of development.

The co-operation of the steel mill engineers which made such an accomplishment possible necessarily came about gradually and the combination of enterprise must be shared by our company with the electrical engineers of the iron and steel industry. In using the word "enterprise" we accept the term in its broadest sense; namely, a certain boldness that dares to do things that have not been done before—that dares

to back up an idea with money and effort—because had it not been for this spirit so highly developed among the steel mill engineers, our company could not have made the progress it has in a field that heretofore was looked upon as practically outside the pale of possibility—so far as the use of precision anti-friction bearings was concerned. It was that spirit of inventiveness—always seeking a newer and better way—willing to test out the new by experiment and never afraid to put both feet squarely on the bridge that separates the old from the new—that culminated in the appointment by the Iron and Steel Electrical Engineers of an anti-friction bearing committee, whose findings took concrete shape in 1924 in a request to the electric motor manufacturers for their co-operation in standardization of anti-friction bearing sizes to be used in electric motors in future—a result in which our company, we believe, can fairly claim to share the credit with the engineers of the iron and steel industry.

BENJAMIN ELECTRIC MANUFACTURING CO.

This company has recently placed on the market a dust-tight glass cover, which, by means of a hinge and rugged gasketed cast holder, may be sealed to the R.L.M. Type RR Reflector.

The cast holder and glass cover are made very heavy and tight to keep out dust vapors and smoke It cuts down labor for maintenance and keeps illumination up to original high values. It makes easy the cleaning of reflectors and replacement of lamps.

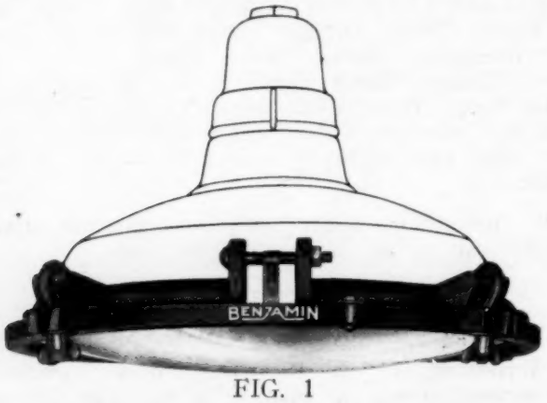

FIG. 1

The illustration shows the dust-tight glass cover sealed to a 14-inch R.L.M. Type RR Benjamin Reflector.

This equipment is particularly adaptable for the iron and steel industry, where there may be present dust, smoke or vapor and where the very nature of the work breeds men of strong physique which, in consequence calls for equipment built to withstand rough handling and hard knocks.

THE ALLIANCE MACHINE CO.

This company announces the addition of a new feature in connection with the construction of their interlocked Ladle Crane, with one line of gearing on the hoists and this operated through a worm gear.

The main hoist drums are interlocked by the drum gears, which are ordinary spur gearing. The principal object of this design is to eliminate gears, pinions, shaft bearings, etc., and also synchronizing the two motors, which are directly connected together to eliminate the thrusts on both worms. The thrust is taken care of by means of standard thrust bearings in the worms as a precaution. This is also so designed that in case one motor burned out or became disabled, the other motor is of ample H.P. to do the work until the motor which is down has been replaced or repaired. Other than the hoist gearing, the cross travel, the other motions of the crane are standard.

HARNISCHFEGER CORPORATION

On December 3, 1924, the corporate name of the Pawling & Harnischfeger Company, of Milwaukee, Wisconsin, was changed to Harnischfeger Corporation. This change of name is merely the public acknowledgment of the debt which the organization owes to its president, Mr. Henry Harnischfeger, through whose energy, foresight and genius, the present standing and size of the company have been made possible.

Mr. Harnischfeger entered into a partnership with Mr .Alonzo Pawling forty years ago, and these two men, with ambition, determination and experience in their respective trades as their principal assets, started a business in a small 26x50 ft., one-story building in the city of Milwaukee. Their shop equipment at that time consisted of an engine lathe, drill press, pattern maker's lathe, wood planer and a few other tools, all driven by a little 4 by 6 slide valve steam engine, insufficient in power to drive both lathe and planer at one and the same time.

Among the different kinds of machines built in the early days may be mentioned file-cutting machines, gram conveyors, carving machinery, brick-making machines, bolt clippers, knitting machinery, the Nordberg poppet valve governor, and various other products. An interesting fact in this connection is that two other large and prominent institutions grew up from the products originally built in the small shop of Pawling & Harnischfeger. These are the Chain Belt Co. and the Nordberg Mfg. Co., the latter having developed from the poppet valve governor designed by Mr. Bruno Nordberg.

Pawling & Harnischfeger soon outgrew their small and cramped shop quarters, and added another floor and a few years later, added a three-story extension. In 1887 an event occurred at a local manufacturing plant which was destined to play an important part in the future of Pawling & Harnischfeger. The Edward P. Allis Co. (now the Allis-Chalmers Mfg. Co.) placed Mr. A. J. Shaw in charge of the rebuilding of one of the rope-driven traveling cranes then in operation at their plant. Mr. Shaw devoted considerable time and thought to the task and his solution, though simple, revolutionized traveling crane design. Instead of using a complicated make-shift rope-drive mechanism, Mr. Shaw conceived the idea of providing a separate electric motor for each motion, namely, hoisting, bridge travel, and trolley travel. This was the first 3-motor electric traveling crane ever built.

The operation of the first crane was so successful that a company was organized to manufacture cranes

(Continued on Page 84)

Electricity's Contribution To The Iron & Steel Industry

Main Roll Drives in the United States and Canada

With this issue of the Iron and Steel Engineer we are publishing for the first time a tabulated list of main roll drives installed in the Iron and Steel Industry.

In the past this information has been published in cataloged forms by the different manufacturing companies, each catalog including only those installations involving their own equipment. It has always been difficult for the electrical engineer in the steel industry to properly analyze the information included in these various publications because of the wide differences in the method of tabulation used by the various manufacturers.

In this tabulation the Iron and Steel Engineer is presenting the information in a uniform manner showing the Horse Power, R.P.M., Voltage, Cycles, Type and Size of mill, Method of drive, date of purchase, name of plant and location. Also a classified list which gives the types of installations in Blooming Mills, Plate Mills, Rail and Structural Mills, Bar and Billet Mills, Sheet Bar and Skelp Mills, Sheet & Tin Plate Plants, Rod Mills, Piercing Mills, Tube Mills, Strip and Hoop Mills, Merchant Mills, Wire Mills, Wheel Mills, Aluminum, Brass, Copper and Non-Ferrous Mills, also the Multi-Speed Drives, A.C. Speed sets, Direct Current Adjustable Speed Drives and Reversing Blooming Mill Drives are tabulated.

This data has been prepared with the view of providing the Executives, and engineers in the Iron and Steel Industry an authority, and a reference manual for their guidance in future installations and extensions.

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300-300	187.5-112.5	2200	25	12" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
2	300-300	187.5-112 5	2200	25	12" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
3	300	225-300	230	d.c.	Merchant (Finishing) Mil	Direct	1916	Pacific Coast Steel Co.	Seattle, Wash.	W
4	300	250	440	25	Sheet Mill	Geared	1910	Simonds Mfg. Co.	Lockport, N. Y.	GE
5	300	250	440	25	Cogging Mill	Geared	1910	Simonds Mfg. Co.	Lockport, N .Y.	GE
6	300	257		60	Roll		1917	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	CW
7	300	290	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
8	300	290	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
9	300	290	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
10	300	290	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
11	300	300	230	d.c.	Cold Rolling Mill	Geared	1914	Trumbull Steel Co.	Warren, Ohio	W
12	300-300	300-180	2200	25	10" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
13	300	300		60	Piercing Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
14	300	300-600	230	d.c.	20" x 30" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
15	300	300-600	230	d.c.	20" x 30" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
16	300	200-600	230	d.c.	22" x 36" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
17	300	300-600	230	d.c.	22" x 36" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
18	300	300	230	d.c.	Cold Rolling Mill	Geared	1920	Alan Wood Iron & Steel Co.	Conshohocken, Pa.	W
19	300	300	2200	60	26" Cold Mill	Coupled		International Nickel Co.	Huntington, W. Va.	AC
20	300	300		60	Piercing Mill	Coupled	1917	Pittsburgh Steel Products Co.	Monessen, Pa.	CW
21	300	300		60	Roll		1917	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	CW
22	300-300	315-630	230	d.c.	8" Merchant Mill	Direct	1919	Donner Steel Co.	Buffalo, N. Y.	GE
23	300	325-650	220	d.c.				Aluminum Co. of America	New Kensington, Pa.	AC
24	300-225-165	335-225-165	6600	25	12" Hot Strip Mill	Geared	1920	Illinois Steel Co.	Gary, Ind.	GE
25	300	340	2200	60	Cold Rolling Mill	Geared	1921	Newton Steel Co.	Newton Falls, Ohio	W
26	300	345-500	500	d.c.	Tube Rolling Mill	Geared	1912	Pittsburgh Steel Prod. Co.	Monessen, Pa.	W
27	300	350	2200	60	Seamless Tube M I	Geared	1915	Timken Roller Bearing Co.	Canton, Ohio	W
28	300	350	2200	60	Cold Rolling Mill	Geared	1915	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
29	300	350	2200	60	Tube Rolling Mill	Geared	1919	Timken Roller Bearing Co.	Canton, Ohio	W
30	300	350-450	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
31	300	350-500		d.c.	Merchant Mill		1915	Buffalo Bolt Co.	N. Tonawanda, N. Y.	CW
32	300	352	2200	60	Cold Roll Mill	Direct	1923	Sharon Steel Hoop Co.	Youngstown, Ohio	W
33	300	353	2200	60	Cold Rolls	Geared		Reeves Mfg. Co.	Dover, Ohio	AC
34	300	360	2200	60	Sheet Mill—Cold Rolls	Geared	1922	U. Alloy Steel Corp., Berger Div.	Canton, Ohio	GE
35	300	360	2300	50	Cold Rolls	Geared	1923	Mansfield Sheet & Tin Plate Co.	Ashtabula, Ohio	GE
36	300	360		60	10" Strip Mill	Coupled	1923	Pittsburgh Steel Co	Glassport, Pa.	CW
37	300	363	220	25	Cold Rolling Mill	Geared	1920	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
38	300	365	2200	25	8" Merchant Mill	Direct	1909	Bethlehem Steel Co.	Johnstown, Pa.	W
39	300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
40	300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
41	300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
42	300	375	2200	25	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
43	300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
44	300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
45	300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
46	300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
47	300	375	2200	25	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
48	300	375	2200	25	10" Bar Mill	Geared	1919	Hammond Steel Co.	Solvay, N. Y.	GE
49	300	375	2200	25		Rope		Bethlehem Steel Co.	Johnstown, Pa.	AC
50	300	375	2200	25		Rope		Bethlehem Steel Co.	Johnstown, Pa.	AC
51	300	375	2200	25	Bar Mill	Coupled		Bethlehem Steel Co.	Johnstown, Pa.	AC
52	300	400	550	40	10" Bar Mill	Geared	1909	Ludlum Steel Co.	Watervliet, N. Y.	GE
53	300-300	400-800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
54	300-300	400-800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
55	300-300	400-800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
56	300-300	400-800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
57	300-300	400-800	230	d.c.	20" x 24" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
58	300-300	400-800	230	d.c.	20" x 24" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
59	300-300	400-800	230	d.c.	20" x 24" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
60	300-300	400-800	230	d.c.	20" x 24" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
61	300	435	2200	60	18" Copper Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
62	300	435	2200	60	24" x 48" Copper Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
63	300	435		d.c.	12" Pipe Mill	Coupled	1910	A. M. Byers Co.	Pittsburgh, Pa.	CW

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
64	300	435		d.c.	12" Pipe Mill	Coupled	1910	A. M. Byers Co.	Pittsburgh, Pa.	CW
65	300	440	2200	60	Roughing Mill	Coupled		Ft. Wayne Rolling Mill Co.	Ft. Wayne, Ind.	AC
66	300	440	2200	60	Cold Roll Mill	Geared	1924	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
67	300	440	2200	60	Cold Roll Mill	Geared	1924	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
68	300	450	440	60	Wire Mill	Geared	1914	American Steel & Wire Co.	Joliet, Ill.	AC
69	300	450	440	60	Wire Mill		1914	American Steel & Wire Co.	Joliet, Ill.	AC
70	300	450-750	230	d.c.	Wheel Mill	Geared	1913	Bethlehem Steel Co.	Johnstown, Pa.	AC
71	300	450-750	230	d.c.	Wheel Mill	Geared	1913	Bethlehem Steel Co.	Johnstown, Pa.	AC
72	300	450	230	d.c.	Merchant Bar Mill	Geared	1916	Carbon Steel Co.	Pittsburgh, Pa.	W
73	300	450	2200	60	8" Merchant Mill		1917	Llewellyn Iron Works	Los Angeles, Cal.	GE
74	300	450	550	60	Bar Mill	Coupled	1921	National Conduit & Cable Co.	Hast. on Hudson, N.Y	AC
75	300	450	220	30	Lap Welding Rolls	Geared	1923	Spang Chalfant Co.	Etna, Pa.	GE
76	300	450	2200	60	Cross Rolls in Tube Mill	Geared	1924	Standard Seamless Tube Co.	Economy, Pa.	GE
77	300	450	2200	60	Cross Rolls in Tube Mill	Geared	1924	Standard Seamless Tube Co.	Economy, Pa.	GE
78	300	485	2200	25	Cold Rolling Mill	Direct	1916	Halcomb Steel Co.	Syracuse, N. Y	W
79	300-300	500-300	2200	25	9" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
80	300-300	500-300	2200	25	8" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
81	300	500	220	25		Geared	1915	Republic Iron & Steel Co.	Youngstown, Ohio	GE
82	300	500	2080	25	9" Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	GE
83	300	500	550	25	Tube Mill	Geared	1917	Baltimore Tube Co.	Baltimore, Md.	W
84	300	500	550	25	Tube Mill	Geared	1917	Baltimore Tube Co.	Baltimore, Md.	W
85	300	500	220	25		Geared	1917	Republic Iron & Steel Co.	Youngstown, Ohio	GE
86	300	500		60	Brass Mill	Coupled	1917	British American Metals Co.	Plainfield, N. J.	CW
87	300	514	440	60	Tube Mill	Geared	1914	Detroit Seamless Tube Co.	Detroit, Mich.	GE
88	300	514	220	60	Tube Mill	Geared	1914	Detroit Seamless Tube Co.	Detroit, Mich.	GE
89	300	514	440	60	Brass Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
90	300	514	2200	60	Bar Mill	Geared	1915	C. G. Hussey	Pittsburgh, Pa.	AC
91	300	514	220	60	Tube Mill	Geared	1918	Detroit Seamless Tube Co.	Detroit, Mich.	AC
92	300	514	550	60	Brass Sheet Mill	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
93	300	514	550	60	14" Cold Strip Mill	Geared	1922	Wallingford Steel Co.	Wallingford, Conn.	GE
94	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
95	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
96	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
97	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
98	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
99	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
100	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
101	300	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
102	300	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
103	300	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
104	300	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
105	300	575	2200	60	Rod Mill	Geared	1922	Standard Underground Cable Co.	Perth Amboy, N. J.	W
106	300	585	440	60	18" Copper Mill	Chain	1916	Standard Underground Cable Co.	Perth Amboy, N. J.	W
107	300-150	590-292	2200	60	9" Merchant (Fin.) Mill	Geared	1920	Cleveland Hardware Co.	Cleveland, Ohio	W
108	300	600	2200	60	Brass Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
109	300	600	2200	60			1915	Cleveland Brass & Copper Co.	Cleveland, Ohio	AC
110	300	600	2200	60			1915	Cleveland Brass & Copper Co.	Cleveland, Ohio	AC
111	300-300-150	600-400-300	440	60	Bar Mill	Chain	1916	Vulcan Crucible Steel Co.	Aliquippa, Pa.	GE
112	300	600	2300	60	12" Billet Mill	Geared	1916	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	GE
113	300	600	2200	60	Merchant Mill	Geared	1916	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	GE
114	300	600	2300	60	Wire Mill	Geared	1917	American Steel & Wire Co.	Waukegan, Ill.	GE
115	300	600	440	60	Brass Mill	Geared	1919	Bristol Brass Co.	Bristol, Conn.	GE
116	300	600	2200	60	10" Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE
117	300	600	440	60	Brass Mill		1920	Detroit Copper & Brass Co.	Detroit, Mich.	AC
118	300	600	440	60			1920	Detroit Copper & Brass Co.	Detroit, Mich.	AC
119	300	600	440	60			1920	Detroit Copper & Brass Co.	Detroit, Mich.	AC
120	300	600	2200	60	Tube Mill	Geared	1922	Weldless Tube Co.	Wooster, Ohio	GE
121	300	600	2200	60	Tube Mill	Geared	1922	Weldless Tube Co.	Wooster, Ohio	GE
122	300	600	2200	60	Cold Sheet Mill Rolls	Geared	1923	Falcon Steel Co.	Niles, Ohio	GE
123	300	600	550	60		Geared		National Conduit & Cable Co.	Hast. on Hudson, N.Y	AC
124	300	600	550	60		Geared		National Conduit & Cable Co.	Hast. on Hudson, N.Y	AC
125	300	720	440	60	14" Merchant Mill	Geared	1913	Union Rolling Mills Co.	Cleveland, Ohio	GE
126	300	720	2200	60	Wire Rod Mill	Geared	1917	Rome Wire Co.	Rome, N. Y.	AC
127	300	720	440	60	12" Merchant Mill	Geared	1919	The Stanley Works	New Britain, Conn.	GE
128	300	720	440	60	Bar Mill	Geared	1920	Hoskins Mfg. Co.	Detroit, Mich.	AC
129	300	750	3000	60	Merchant Mill	Geared	1923	Cons. Rolling Mills Co.	Mexico City, Mex.	GE
130	300	750	2200	25	10" Bar Mill	Geared	1923	Bethlehem Steel Co.	Lebanon, Pa.	GE
131	300-200	920-360	220	d.c.	Merchant Mill	Direct	1919	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
132	325	360	2200	60	Bar Mill	Geared	1915	Heppenstall Forge & Knife Co.	Pittsburgh, Pa.	GE
133	325	600	2300	60	Wire Mill	Geared	1917	American Steel & Wire Co.	Waukegan, Ill.	GE
134	340	85		d.c.	Welding Rolls	Coupled	1905	National Tube Co.	McKeesport, Pa.	CW
135	350	125	6600	25	12" Bar Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
135	350	145	2200	60	Cold Rolling Mill	Rope	1912	Central Steel Co.	Massillon, Ohio	W
137	350-350	150-100	6600	25	12" Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
138	350	200-300	250	d.c.	9" Merchant Mill	Direct	1919	National Farming Mach. Co., Ltd.	Montmagny, P. Q.	W
139	350-350	240-480	240	d.c.	10" Merchant Mill	Direct	1923	LaClede Steel Co.	St. Louis, Mo.	GE
140	350	242	2200	25	Cold Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
141	350	250	2200	25	10" Rod Mill	Direct	1911	Dillworth Porter Co.	Pittsburgh, Pa.	GE
142	350	250	440	25	Brass Mill	Geared	1921	Harrison Radiator Corp.	Lockport, N. Y.	GE
143	350	250-325	230	d.c.	9" Merchant Mill	Direct	1921	Wayne Steel Co.	Erie, Pa.	W
144	350-350	275-470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	GE
145	350-350	275-470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	GE
146	350-350	275-470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Co.	Kenosha, Wis.	GE
147	350-350	275-470	375	d.c.	Reversing Copper Mill	Geared	1922	Taunton-New Bedford Copper Co.	Taunton, Mass.	GE
148	350-235	300-200	6600	25	Merchant Mill	Geared	1920	Illinois Steel Co.	Gary, Ind.	GE
149	350	300		d.c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
150	350	300		d.c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
151	350	300		d.c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
152	350	300		d.c.	Wire Draw Bench	Coupled	1911	Pittsburgh Steel Co.	Monessen, Pa.	CW
153	350	345	440	60	Sheet Mill	Geared	1917	Universal Steel Co.	Bridgeville, Pa.	W
154	350	320	2200	60	21" Plate (Cold Roll.) Mill	Geared	1910	Oliver Iron & Steel Co.	Wilson Station, Pa.	W
155	350-350	360-240	240	d.c.	10" Merchant Mill	Direct	1911	LaClede Steel Co.	St. Louis, Mo.	GE
156	350	360	2200	60	Sheet Mill—Cold Rolls	Geared	1919	Falcon Steel Co.	Niles, Ohio	GE
157	350-350	360-450	230	d.c.	Welding Rolls	Direct	1920	National Tube Co.	Lorain, Ohio	GE
158	350-350	360-450	230	d.c.	Welding Rolls	Direct	1920	National Tube Co.	Lorain, Ohio	GE
159	350-350	360-240	440	60	Bar Mill	Coupled	1921	Simmons Mfg. Co.	Kenosha, Wis.	AC
160	350-350	375-214	6600	25	9" Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
161	350	400	2200	60	Wire Rod Mill	Geared	1918	Taunton-New Bedford Copper Co.	New Bedford, Mass.	AC
162	350	400	2200	60	Wire Rod Mill	Coupled	1918	Taunton-New Bedford Copper Co.	New Bedford, Mass.	AC
163	350	400	2200	60	Wire Rod Mill	Coupled	1918	Taunton-New Bedford Copper Co.	New Bedford, Mass.	AC
164	350	400-600		d.c.	Hot Mill	Geared	1913	Bethlehem Steel Co.	Lackawanna, N. Y.	CW
165	350	420	2200	50	Merchant Mill	Geared	1919	Southern California Iron & Steel Co	Los Angeles, Cal.	W
166	350	435	2200	60	Pipe Welding Rolls	Geared	1919	Wheeling Steel Corporation	Steubenville, Ohio	W
167	350	480	2200	25	12" Roughing Mill	Geared	1923	Halcomb Steel Co.	Syracuse, N. Y.	W
168	350	490	6400	25	24" Flat Edging Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
169	350	490	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
170	350	490	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
171	350	500	230	d.c.	16" Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
172	350	524-850	230	d.c.	18" Blading Mill	Geared	1924	W. E. & M. Co.	South Phila. Works	W
173	350	580	2200	60	Merchant Mill	Geared	1916	Copper Clad Steel Co.	Pittsburgh, Pa.	W
174	350	590	2200	60	12" Merchant Mill	Geared	1918	Indianapolis & Eastern TractionCo.	Indianapolis, Ind.	W

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
175	350	600	2200	60	Bar Mill	Belted	1920	Joslyn Mfg. Co.	Chicago, Ill.	AC
176	350	700	2200	60	Merchant Mill	Geared	1918	Kilby Car & Foundry Co.	Anniston, Ala.	W
177	360	300–425	230	d.c.	8″ Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
178	360	300–600	230	d.c.	Rod Mill	Direct	1922	United Alloy Steel Corporation	Canton, Ohio	W
179	360	350–500	230	d.c.	7″ Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
180	375	430–860	230	d.c.	20″ Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
181	375	430–860	230	d.c.	20″ Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
182	375	430–860	230	d.c.	20″ Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
183	375	430–860	230	d.c.	20″ Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
184	375	430–860	230	d.c.	20″ Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
185	400	20		d.c.	32″ x 48″ Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Indiana	CW
186	400	20		d.c.	32″ x 48″ Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Indiana	CW
187	400	20		d.c.	32″ x 48″ Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Indiana	CW
188	400	20		d.c.	32″ x 48″ Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Indiana	CW
189	400	75		d.c.	Welding Rolls	Coupled	1906	National Tube Co.	McKeesport, Pa.	CW
190	400–400	107– 64	2200	25	16″ Bar Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
191	400	125	230	d.c.	12″ Structural Mill	Direct	1919	Eastern Steel Co.	Pottsville, Pa.	W
192	400	200–300	230	d.c.	9″ Merchant Mill	Direct	1914	United Alloy Steel Corporation	Canton, Ohio	W
193	400	210–350		d.c.	Merchant Mill		1915	Buffalo Bolt Co.	No. Tonawanda, N. Y	CW
194	400–400	250–500	230	d.c.	10″ Merchant Mill	Direct	1920	Timken Roller Bearing Co.	Canton, Ohio	GE
195	400–400	275–500	550	d.c.	12″ Hot Strip Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	GE
196	400	290	2200	60	Cold Rolling Mill	Geared	1916	Youngstown Sheet & Tube Co.	Warren, Ohio	W
197	400	290	2200	60	Cold Rolling Mill	Geared	1917	Liberty Steel Co.	Warren, Ohio	W
198	400	300	2200	25	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
199	400	300	2200	25	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
200	400	300	2200	25	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
201	400	300	2200	25	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
202	400	300	2200	25		Geared	1918	Pittsburgh Steel Co.	Monessen, Pa.	AC
203	400	300	440	60			1918	Withrow Steel Co.	Neville Island, Pa.	AC
204	400–500	300–600	600	d.c.	9″ Merchant Fin. Mill	Geared	1921	Driver Harris Co.	Harrison, N. J.	W
205	400	350	440	60	9″ Copper Finishing Mill	Direct	1916	Standard Underground Cable Co.	Perth Amboy, N. J.	W
206	400	352	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
207	400	360	2200	60	Sheet Mill, Cold Rolls	Geared	1916	Mahoning Valley Steel Co.	Niles, Ohio	GE
208	400	360	2200	60	Sheet Mill, Cold Rolls	Geared	1916	Mahoning Valley Steel Co.	Niles, Ohio	GE
209	400	360	2200	60	Brass Mill	Geared	1917	American Brass Co.	Waterbury, Conn.	GE
210	400	360	2200	60	Brass Mill	Geared	1917	American Brass Co.	Waterbury, Conn.	GE
211	400	360	2200	60	Cold Roll Sheet Mill	Geared	1918	Reeves Mfg. Co.	Canal Dover, Ohio	GE
212	400	360	2200	60	Brass Mill	Geared	1921	American Brass Co.	Torrington, Conn.	GE
213	400	360	2200	60	Brass Mill	Geared	1921	American Brass Co.	Torrington, Conn.	GE
214	400	360	440	60	Cold Strip Mill	Geared	1921	American Tube and Stamping Co.	Bridgeport, Conn.	GE
215	400	360	440	60			1921	Detroit Copper & Brass Co.	Detroit, Mich.	AC
216	400	360		60	8″ Strip Mill	Coupled	1923	Pittsburgh Steel Co.	Glassport, Pa.	CW
217	400	375	220	25	20″ Tube Mill, Wld. Rolls	Geared	1909	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
218	400	375	220	25	Tube Mill, Chill Rolls	Geared	1909	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
219	400	375	2200	25	Wire Drawing Bench	Rope	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
220	400	375	2200	25	Wire Drawing Bench	Rope	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
221	400	375	220	25	Tube Mill, Wld. Rolls	Geared	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
222	400	375	220	25	Tube Mill, Wld. Rolls	Geared	1912	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
223	400	375	220	25	Tube Mill, Wld. Rolls	Geared	1922	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
224	400	385	550	40	22″ Puddle Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
225	400	400–450	220	d.c.	8″ Merchant Mill	Direct	1911	Illinois Steel Co.	Milwaukee, Wis.	W
226	400	400	400	60	Bar Mill	Chain	1918	Latrobe Steel Co.	Latrobe, Pa.	AC
227	400	400	440	60	Lap Welding Rolls	Geared	1923	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	GE
228	400	400	440	60	Lap Welding Rolls	Geared	1923	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	GE
229	400	435	2200	60	Aluminum Mill	Geared	1918	U. S. Aluminum Co.	New Kensington, Pa.	W
230	400	435	2200	60	Aluminum Mill	Geared	1918	U. S. Aluminum Co.	New Kensington, Pa.	W
231	400	435	440	60	Pipe Mill	Geared	1918	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
232	400	435	2200	60	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Edgewater, N. J.	W
233	400	440	2200	60	Copper Rod Mill	Geared	1922	American Brass Company	Kenosha, Wis	W
234	440	400	4000	60		Coupled	1923	Bryden Neverslip Co.	Catasauqua, Pa.	AC
235	400	450	2200	60	Brass Mill	Geared	1917	American Brass Co.	Waterbury, Conn.	GE
236	400	450	2200	60	Bar Mill		1917	Standard Seamless Tube Co.		AC
237	400	450	550	60		Geared	1918	Pressed Steel Car Co.	McKees Rocks, Pa.	AC
238	400	450	2200	60	Wire Drawing Bench	Geared	1919	Gulf States Steel Co.	Birmingham, Ala.	GE
239	400	450	2200	60	Wire Drawing Bench	Geared	1919	Gulf States Steel Co.	Birmingham, Ala.	GE
240	400	450	440	60	Brass Sheet Mill	Geared	1920	Detroit Copper & Brass Co.	Detroit, Mich.	GE
241	400	450	440	60			1921	Detroit Copper & Brass Co.	Detroit, Mich.	AC
242	400	450	440	60	Sheet Mill	Geared	1924	New Jersey Zinc Co.	Palmerton, Pa.	GE
243	400	450	440	60	Sheet Mill	Geared	1924	New Jersey Zinc Co.	Palmerton, Pa.	GE
244	400	450	2200	60	9″ Bar Mill	Geared	1924	Atchison, Topeka & S. F. Ry. Co.		AC
245	400	450	2200	60	12″ Bar Mill	Geared	1924	Atchison, Topeka & S. F. Ry. Co.		AC
246	400	485	440	25	9″ Merchant Mill	Geared	1916	Hess Steel Corporation	Baltimore, Md.	W
247	400	514	2200	60			1915	Cleveland Brass & Copper Co.	Cleveland, Ohio	AC
248	400	514	2200	60	Brass Tubes	Geared	1915	American Brass Company	Waterbury, Conn.	GE
249	400	514	2200	60	Brass Tubes	Geared	1915	American Brass Company	Waterbury, Conn.	GE
250	400	514	2200	60	24″ Roughing Mill	Geared	1915	American Brass Company	Kenosha, Wis.	AC
251	400	514	2200	60	20″ Flat Mill	Geared	1915	American Brass Company	Kenosha, Wis.	AC
252	400	514	2200	60	18″ Bar Mill	Geared	1915	American Brass Company	Kenosha, Wis.	AC
253	400	514	440	60	16″ Copper Bar Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
254	400	514	2200	60	Bar Mill	Geared	1919	Judson Mfg. Co.	Oakland, Calif.	AC
255	400	514	2200	60	Brass Mill	Geared	1922	Western Cartridge Co.	East Alton, Ill.	GE
256	400	514	6600	60				Weirton Steel Co.	Weirton, W. Va.	AC
257	400	514	6600	60				Weirton Steel Co.	Weirton, W. Va.	AC
258	400	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
259	400	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
260	400	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
261	400	575	2200	60	Cold Rolling Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
262	400	575	440	50	Sheet Cop. Rolling Mill	Geared	1923	American Metal Products Co.	Milwaukee, Wis.	W
263	400	585	4000	50	14″ Merchant Mill	Geared	1922	Calumet Steel Co.	Chicago, Ill.	W
264	400–225	600–300	550	40	Bar Mill	Geared	1909	Ludlum Steel Co.	Watervliet, N. Y.	GE
265	400	600	440	60	Piercing Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
266	400	600	440	60	Billet Piercing Machine	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
267	400	600	440	60	Brass Mill	Geared	1917	Rome Brass & Copper Co.	Rome, N. Y.	GE
268	400	600	2200	60	Wire Rod Mill	Geared	1917	Rome Wire Co.	Rome, N. Y.	AC
269	400	600	440	60	Wire Mill	Coupled	1917	Rome Wire Co.	Rome, N. Y.	AC
270	400	600	440	60	12″ Merchant Mill	Geared	1919	The Stanley Works	New Britain, Conn.	GE
271	400	600	440	60	Tube Mill	Geared	1920	Globe Seamless Tube Co.	Milwaukee, Wis.	AC
272	400	600	2200	60	Brass Mill	Geared	1921	American Brass Company	Torrington, Conn.	GE
273	400	600	550	60		Geared	1921	National Conduit & Cable Co.	Hast.on Hudson,N.Y.	AC
274	400	600	2200	60	Zinc Mill	Geared	1922	Ball Brothers Glass Co.	Muncie, Ind.	GE
275	400	600	220	60		Coupled		Consumers Steel Co.	Chicago, Ill.	AC
276	400	705	2200	60	16″ Cogging Mill	Geared	1923	Crucible Steel Co. of America Park Works	Pittsburgh, Pa.	W
277	400	720–450	2200	60	Bar Mill	Geared	1917	Cyclops Steel Co.	Titusville, Pa.	AC
278	400	720	2200	60	Copper Mill	Geared	1920	Rome Wire Co.	Rome, N. Y.	GE
279	400	720	550	60	Copper Mill	Geared	1920	Phillips Wire Co.	Pawtucket, R. I.	GE
280	400–265	875–585	2200	60	Bar Mill	Geared	1913	Old Dominion Iron & Nail Co.	Richmond, Va.	W
281	400	900	550	60	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
282	400	900	550	60	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
283	400	900	550	60	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
284	400	900	550	60	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
285	400	900	550	60	Brass Mill	Geared	1921	American Brass Company	Ansonia, Conn.	GE
286	450	125	6600	25	12″ Bar Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
287	450	200–400	230	d.c.	Zinc Sheet Mill, 26″ x 72″	Geared	1924	Illinois Zinc Co.	Peru, Illinois	W
288	450	300	2200	60			1918	Pittsburgh Steel Prod. Co.	Monessen, Pa.	AC
289	450	300	2200	60			1918	Pittsburgh Steel Prod. Co.	Monessen, Pa.	AC
290	450	300		d.c.	10″ Tube Mill	Coupled	1911	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	CW
291	450	354–230	2200	60	8″ Merchant Mill	Direct	1919	Bourne-Fuller Co.	Cleveland, Ohio	W
292	450	400–650	230	d.c.	Rod (1 Stand) No. 2 Mill	Direct	1913	American Steel & Wire Co.	Worcester, Mass.	W
293	450	440	2200	60	Merchant Mill	Geared	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
294	450	440–350	2220	60	Cont. Hoop (Finishing)	Direct	1920	Conners Steel Co.	Birmingham, Ala.	W
295	450	450–600	230	d.c.	12″ Cold Strip Mill	Geared	1915	Superior Steel Co.	Carnegie, Pa.	W
296	450	450–600	230	d.c.	12″ Cold Strip Mill	Geared	1915	Superior Steel Co.	Carnegie, Pa.	W
297	450	450	2080	60	18″ Merchant Mill	Geared	1919	Columbia Steel Co.	Pittsburgh, Cal.	GE
298	450	450	2080	60	12″ Merchant Mill	Geared	1919	Columbia Steel Co.	Pittsburgh, Cal.	GE
299	450	500	440	60	Brass Rolling Mill	Geared	1918	Michigan Copper & Brass Co.	Detroit, Mich.	W
300	450	514	550	60	14″ Cold Strip Mill	Geared	1922	Wallingford Steel Co.	Wallingford, Conn.	GE
301	450	550–750		d.c.	Zinc Rolls	Coupled	1924	Mattheisen & Hegeler Zinc Co.	LaSalle, Ill.	CW
302	450	585	2200	50	14″ Merchant Mill	Geared	1918	Columbia Steel Co.	Los Angeles, Cal.	W
303	450	600	550	50	Copper Rod Mill	Geared	1920	Phillips Wire Co.	Pawtucket, R. I.	GE
304	450	700–595	2200	60	Cont. Hoop (Finishing)	Direct	1921	Conners Steel Co.	Birmingham, Ala.	W
305	450	720	2200	60	Piercing Mill	Geared	1924	Standard Seamless Tube Co.	Economy, Pa.	GE
306	450	730–490	4000	25	10″ Merchant Mill	Geared	1917	Atlas Steel Corporation	Dunkirk, N. Y.	W
307	450	870	440	60	Copper Clad Mill	Geared	1915	Duplex Metal Co.	Philadelphia, Pa.	W
308	450–360	870–695	2200	60	10″ Merchant Mill	Geared	1914	Cleveland Hardware Co.	Cleveland, Ohio	W
309	450–360	875–700	2200	60	9″ Merchant Mill	Geared	1915	National Lock Washer Co.	Riverside, N. J.	W
310	475–350	240–181	440	25	10″ Merchant Mill	Direct	1914	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
311	485–360	870–695	2200	60	10″ Merchant Mill	Geared	1915	Old Dominion Iron & Nail Co.	Richmond, Va.	W
312	500	0–200	500	d.c.	78″ Reversing Brass Plate	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
313	500	88	6600	25	16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
314	500–385–250	130–100–65	440	25	14″ Merchant Mill	Direct	1923	Halcomb Steel Co.	Syracuse, N. Y.	GE
315	500	150–225	250	d.c.	12″ Merchant Mill	Direct	1919	National Farming Mach. Co., Ltd.	Montmagny, P. Q.	W
316	500	155–500	250	d.c.	Tyre Mill	Direct	1923	McConway Torley Co.	Pittsburgh, Pa.	W
317	500	184	2200	25	12″ Merchant Mill	Rope	1905	Ontario Iron & Steel Co.	Welland, Ont.	W
318	500	184	2200	25	16″ Merchant Mill	Direct	1908	Bethlehem Steel Co.	Johnstown, Pa.	W
319	500	190	230	d.c.	18″ Tandem Rough. Mill	Rope	1910	Sharon Steel Hoop Co.	Sharon, Pa.	GE
320	500	190	230	d.c.	24″ Blooming Mill	Geared	1910	Sharon Steel Hoop Co.	Sharon, Pa.	GE
321	500	214	6600	25	Axle Mill	Geared	1909	Illinois Steel Co.	Gary, Ind.	GE
322	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
323	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
324	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
325	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
326	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
327	500	234		60	Tube Mills	Coupled	1922	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
328	500–330	242–161	440	25	16″ and 10″ Merchant Mill	Direct & Rope	1913	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
329	500	244	2200	25	10″ Merchant Mill	Direct	1908	Bethlehem Steel Co.	Johnstown, Pa.	W
330	500–500	250–325	230	d.c.	8″ Hoop Mill	Direct	1909	Atlantic Steel Co.	Atlanta, Ga.	GE
331	500	250–500	230	d.c.	9″ Hoop Mill Finishing	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
332	500	250	440	25	10″ Bar Mill	Geared	1917	Simonds Manufacturing Co.	Lockport, N. Y.	GE
333	500	250		60	Tube Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
334	500	250		60	Tube Mill	Geared	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
335	500	250	6600	25	Sheet Mill Cold Rolls	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
336	500	250–350	600	d.c.	9″ Merchant Mill	Direct	1921	Missouri Rolling Mill Co.	St. Louis ,Mo.	W
337	500	290	4000	60	8″ Merchant Mill	Direct	1920	Calumet Steel Co.	Cicago, Ill.	W
338	500	290	2200	25	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
339	500	300	2200	60	Sheet Mill		1915	U. S. Aluminum Co.	New Kensington, Pa.	AC
340	500	300	2200	60	Sheet Mill		1915	U. S. Aluminum Co.	New Kensington, Pa.	AC
341	500	300	2200	60	Sheet Mill		1915	U. S. Aluminum Co.	New Kensington, Pa.	AC
342	500	300	2200	60	Squeezer	Geared	1919	Pacific Coast Steel Co.	Seattle, Wash.	AC
343	500	300	2200	60	Bar Mill	Coupled	1920	Ft. Wayne Rolling Mill Co.	Ft. Wayne, Ind.	AC
344	500	300–450	230	d.c.	Lap Welding Mill	Coupled	1923	Gary Tube Co.	Gary, Ind.	AC
345	500	320	2200	60	12″ Merchant Mill	Geared	1919	Baltimore & Ohio Railroad	Cumberland, Md.	W
346	500–500	327–200	440	60	9″ Merchant Mill	Direct	1913	Bourne-Fuller Co.	Cleveland, Ohio	GE
347	500	350	2200	60	Cold Rolling Mill	Geared	1916	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
348	500	350	440	60	Cold Rolling Mill	Geared	1916	Andrews Steel Co.	Newport, Ky.	W
349	500	360	2200	25	8″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Johnstown, Pa.	W
350	500	360	2200	60	Tube Mill	Geared	1915	American Brass Company	Waterbury, Conn.	GE
351	500	360	2200	60	16″ Bar Mill	Geared	1915	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	GE
352	500	360	2200	60	Copper Mill	Geared	1917	Anaconda Copper Mining Co.	Black Eagle, Mont.	GE
353	500	360	2200	60	Sheet Mill, Cold Rolls	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
354	500	360	2200	60	Sheet Mill, Cold Rolls	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
355	500	360	2200	60	Sheet Mill, Cold Rolls	Geared	1920	Republic Iron & Steel Co.	Youngstown, Ohio	GE
356	500	360	2200	60	Billet Piercing Mill	Geared	1922	Weldless Tube Co.	Wooster, Ohio	GE
357	500	360	440	60	Brass Mill	Direct	1923	Rome Brass and Copper Co.	Rome, N. Y.	GE
358	500	360	440	60	Brass Mill	Direct	1923	Rome Brass and Copper Co.	Rome, N. Y.	GE
359	500	365	440	25	Copper Rolling Mill	Rope	1922	Baltimore Copper Smelt.& Roll.Co.	Baltimore, Md.	W
360	500	368	2200	25	Brass Mill	Geared	1920	American Brass Company	Kenosha, Wis.	W
361	500	375	2200	25	Wheel Mill	Geared	1913	Bethlehem Steel Co.	Johnstown, Pa.	AC
362	500	375	2300	25		Geared	1919	Buffalo Copper & Brass Co.	Buffalo, N. Y.	AC
363	500–500	400–600	230	d.c.	Hoop Mill	Geared	1920	Atlantic Steel Co.	Atlanta, Ga.	GE
364	500	435	440	60	8″ Merchant Mill	Rope	1911	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
365	500	435	440	60	8″ Merchant Mill	Rope	1912	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
366	500	435	440	60	8″ Merchant Mill	Rope	1912	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
367	500	435	440	60	9″ Merchant (Fin.) Mill	Belted	1914	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
368	500	435	440	60	10″ Merchant Mill	Belted	1914	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
369	500	435	2200	60	Merchant Mill	Geared	1916	Seymour Manufacturing Co.	Waterbury, Conn.	W
370	500	440	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
371	500	440	2200	60	Roughing Mill	Geared	1924	Universal Steel Co.		AC
372	500	440	4000	60		Coupled	1923	Bryden Neverslip Co.	Catasauqua, Pa.	AC
373	500	442	2200	60	Cold Rolling Mill	Geared	1922	Follansbee Bros. Co.	Toronto, Ohio	W
374	500	450	440	60	Bar Mill	Geared	1910	Chase Rolling Mills Co.	Waterbury, Conn.	GE
375	500	450	440	50	Bar Mill	Geared	1910	Chase Rolling Mills Co.	Waterbury, Conn.	GE
376	500	450	550	60	12″ Cold Roll Mill	Geared	1914	Worcester Pressed Steel Co.	Worcester, Mass.	GE
377	500	450	440	60	16″ Bar Mill	Geared	1914	Carbon Steel Co.	Pittsburgh, Pa.	GE
378	500	450	2200	50	Brass Mill	Geared	1915	Scoville Manufacturing Co.	Waterbury, Conn.	GE
379	500	450	2200	50	Brass Mill	Geared	1915	Scoville Manufacturing Co.	Waterbury, Conn.	GE
380	500	450	2200	60	Brass Mill	Geared	1915	Scoville Manufacturing Co.	Waterbury, Conn.	GE
381	500	450	2200	50	Brass Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
382	500	450	2200	50	Billet Mill	Geared	1915	International High Speed Steel Co.	Rockaway, N. J.	GE
383	500	450	2200	60	Sheet Mill	Geared	1915	American Brass Company	Torrington, Conn.	GE
384	500	450	2200	60	Tube Mill	Geared	1916	Ohio Seamless Tube Co.	Shelby, Ohio	GE
385	500	450	440	60	20″ Copper Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
386	500	450	440	60	Wire Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
387	500	450	2300	60	Merchant Mill	Geared	1916	Pacific Coast Steel Co.	San Francisco, Cal.	GE
388	500	450	2200	60	Copper Mill	Geared	1917	Anaconda Copper Mining Co.	Black Eagle, Mont.	GE
389	500	450	2200	60	Copper Mill	Geared	1917	Anaconda Copper Mining Co.	Black Eagle, Mont.	GE
390	500	450	2200	60	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
391	500	450	2200	60	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
392	500	450		60	20″ Copper Mill	Coupled	1918	Waclark Wire Co.	Bayway, N. J.	CW
393	500	450	2200	60	Tube Mill	Geared	1919	Ohio Seamless Tube Co.	Shelby, Ohio	GE
394	500	450	440	60	Brass Sheet Mill	Geared	1920	Detroit Copper & Brass Co.	Detroit, Mich.	GE

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
395	500	450	2200	60	Brass Mill	Geared	1921	American Brass Company	Torrington, Conn.	GE
396	500	450	2200	60	Brass Mill	Geared	1921	American Brass Company	Torrington, Conn.	GE
397	500	450	2200	60	14″ Roughing Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	AC
398	500	450	2200	60	9″ Finishing Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	AC
399	500	450		60	Hoop Mill	Geared	1912	Carnegie Steel Co.	Pittsburgh, Pa.	CW
400	500	480–250		d.c.	Merchant Mill	Coupled	1923	Buffalo Bolt Co.	N. Tonawanda, N. Y.	CW
401	500	487	6600	25	8″ Merchant Mill	Direct	1913	Minnesota Steel Co.	Duluth, Minn.	W
402	500	500	2300	25	Milling Machine	Direct	1914	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
403	500–500–500	500–375–265	2200	25	10″ Merchant Mill	Direct & Belt	1916	Donner Steel Co.	Buffalo, N. Y.	GE
404	500	500	550	25	Tube Mill	Geared	1917	Baltimore Tube Co.	Baltimore, Md.	W
405	500	500	2300	25	18″ Merchant Mill	Geared	1919	Halcomb Steel Co.	Syracuse, N. Y.	GE
406	500	500	2200	25	16″ Bar Mill	Geared	1919	Hammond Steel Co.	Solvay, N. Y.	GE
407	500	500		25	Continuous Tube Mill	Coupled	1915	Pittsburgh Steel Products Co.	Monessen, Pa.	CW
408	500	514	440	60	Bar Mill	Chain	1915	Simmons Mfg. Co.	Kenosha, Wis.	AC
409	500	514	2200	60	Bar Mill	Rope	1917	Henry Disston & Son	Philadelphia, Pa.	AC
410	500	514	550	60	18″ Copper Mill	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
411	500	514	2200	60	Bar Mill	Geared	1919	Judson Mfg. Co.	Oakland, Calif.	AC
412	500	514	2200	60	Bar Mill	Geared	1920	Metals Production Equipment Co.	Springfield, Mass.	AC
413	500	514	2200	60	Bar Mill	Geared	1920	Metals Production Equipment Co.	Springfield, Mass.	AC
414	500	514	2200	60	Bar Mill	Geared	1920	Metals Production Equipment Co.	Springfield, Mass.	AC
415	500	514	2200	60	Brass Mill	Geared	1922	Western Cartridge Co.	East Alton, Ill.	GE
416	500	575–865	2200	60	10″ Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	W
417	500	575–865	2200	60	10″ Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	W
418	500	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
419	300	575	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
420	500	575	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
421	500	585	2200	60	Copper Rod Mill	Geared	1922	Eugene F. Phillips Elec. Wks., Ltd.	Montreal, Que.	W
422	500	600	2200	60			1913	Cleveland Brass & Copper Co.	Cleveland, Ohio	AC
423	500	600	2200	60	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
424	500	600	2200	60	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
425	500	600	2200	60	Brass Mill	Geared	1917	American Brass Company	Torrington, Conn.	GE
426	500	600	2200	60	Bar Mill	Belted	1919	Joslyn Mfg. Co.	Chicago, Ill.	AC
427	500	600	2200	60	Merchant Mill	Geared	1923	Taunton-New Bedford Copper Co.	Taunton, Mass.	GE
428	500	600	2200	60	Copper Rolling Mill	Geared	1923	American Brass Company	Torrington, Conn.	GE
429	500	730–485	2200	50	8″ Merchant Mill	Geared	1919	Southern California Iron & Steel Co.	Los Angeles, Cal.	W
430	500–250	750–375	3000	50	Merchant Mill	Geared	1923	Consolidated Rolling Mills Co.	Mexico City, Mex.	GE
431	500–400	775–585	550	40	10″ Merchant Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
432	500	870	2200	60	16″ Merchant Mill	Geared	1919	McConway-Torley Co.	Pittsburgh, Pa.	W
433	500–400	875–700	550	60	10″–14″ Merchant Mill	Geared	1916	The Texas Steel Co.	Fort Worth, Texas	W
434	500	888–540	6600	60	11″ Finishing Stand	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
435	500–250	890–513 440–256	2200	60	10″ Merchant Mill	Geared	1919	Hunter Crucible Steel Co.	Cleveland, Ohio	W
436	525	125	2200	25	Merchant Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
437	525	125	2200	25	Merchant Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
438	550	120–300	250	d.c.	10″ Merchant Mill	Direct	1923	Firth Sterling Steel Co.	McKeesport, Pa.	W
439	550	320–206	2200	60	10″ Hoop Mill	Direct	1917	Atlantic Steel Co.	Atlanta, Ga.	W
440	550	575	2200	60	16″ Skelp Mill	Geared	1919	Tyler Tube & Pipe Co.	Washington, Pa.	W
441	550–360	875–585	2200	60	12″ Merchant Mill	Geared	1918	Norfolk & Western Railroad	Roanoke, Va.	W
442	550	880	2200	60	16″ Merchant Mill	Geared	1919	Danville Structural Tubing Co.	Danville, Pa.	W
443	550	880	2200	60	Merchant Mill	Geared	1921	Danville Structural Tubing Co.	Danville, Pa.	W
444	575	300–214	6600	25	10″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
445	575–575	375–250	6600	25	8″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
446	600	150	550	60	Sheet Mill, Cold Rolls	Rope	1909	Weirton Steel Co.	Weirton, W. Va.	GE
447	600–600	150–250	575	d.c.	6″ Hot Strip Mill	Direct	1913	American Steel & Wire Co.	Cleveland, Ohio	GE
448	600	171	440	40	Bar Mill	Geared	1910	Ludlum Steel Co.	Watervliet, N. Y.	GE
449	600	200–300	230	d.c.	9″ Merchant Mill	Direct	1914	United Alloy Steel Corporation	Canton, Ohio	W
450	600	200–300	230	d.c.	9″ Merchant (Fin.) Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
451	600–600	214– 93	6600	25	12″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
452	600	214	440	25			1920	Baltimore Copper S. & R. Co.	Baltimore, Md.	AC
453	600	214	440	25			1920	Baltimore Copper S. & R. Co.	Baltimore, Md.	AC
454	600–600	225–425	550	d.c.	12″ Hot Strip Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	GE
455	600–525	250–125	2200	25	16″ & 14″ Merchant Mill	Direct & Rope	1913	Bethlehem Steel Co.	Steelton, Pa.	GE
456	600–600	300–214	2200	25	Bar Mill	Coupled & Rope	1914	St. Louis Screw Co.	St. Louis, Mo.	AC
457	600	300–214	2200	25	Bar Mill	Chain	1914	St. Louis Screw Co.	St. Louis, Mo.	AC
458	600	300	2200	25	Muck Mill	Chain	1914	St. Louis Screw Co.	St. Louis, Mo.	AC
459	600	300	2200	60	Sheet Mill	Geared	1917	Universal Rolling Mill Co.	Bridgeville, Pa.	AC
460	600	300		60	Tube Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
461	600	300	440	25	Tandem Plate Mill	Rope	1920	Baltimore Copper S. & R. Co.	Baltimore, Md.	AC
462	600	300	440	25	Tandem Plate Mill	Rope	1920	Baltimore Copper S. & R. Co.	Baltimore, Md.	AC
463	600	300		60	Tube Mill	Coupled	1917	Pittsburgh Steel Products Co.	Monessen, Pa.	CW
464	600	300–330		d.c.	10″ Bar Mill	Coupled	1921	Universal Steel Co.	Bridgeville, Pa.	CW
465	600–400–200	321–214–107	440	25	9″ Merchant Mill	Direct	1923	Halcomb Steel Co.	Syracuse, N. Y.	GE
466	600	360	2200	60	Tube Mill	Geared	1914	Standard Seamless Tube Co.	Economy, Pa.	GE
467	600	360	2200	60	10″ Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE
468	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
469	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
470	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
471	600	360	440	60	Copper Mills	Geared	1923	Am. Insulated Wire & Cable Co.	Chicago, Ill.	GE
472	600	365	6600	25	10″ Merchant Mill	Direct	1913	Minnesota Steel Co.	Duluth, Minn.	W
473	600	368	6600	25	18″–21″ Roughing Mill	Geared	1924	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
474	600–400	375–210	2200	25	9″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
475	600	390	440	60	20″ Merchant Mill	Geared	1916	Stanley Works	New Haven, Conn.	W
476	600	390	440	60	Cold Strip Mill	Geared	1917	Stanley Works	New Haven, Conn.	W
477	600	440	2200	60	10″ Rod Mill	Direct	1917	Wickwire Spencer Steel Corp.	Palmer, Mass.	W
478	600	450	2200	60	Aluminum Strip Mill	Geared	1914	Cleveland Metal Products Co.	Cleveland, Ohio	GE
479	600–600–600	469–375–281	2200	25	8″ Merchant Mill	Direct	1919	Donner Steel Co.	Buffalo, N. Y.	GE
480	600	485	2200	25	10″ Merchant Mill	Direct	1912	Laclede Steel Co.	Alton, Ill.	W
481	600	485	440	25	20″ Merchant Mill	Geared	1915	Hess Steel Corporation	Baltimore, Md.	W
482	600	485	550	25	Piercing Mill	Geared	1915	Baltimore Tube Co.	Baltimore, Md.	W
483	600	490	2200	25	16″ Bar Roughing Mill	Geared	1919	Scullin Steel Co.	St. Louis, Mo.	W
484	600	500	2200	60	20″ Merchant Mill	Geared	1916	Carpenter Steel Co.	Reading, Pa.	W
485	600	500	2200	60	16″ Merchant Mill	Geared	1917	Central Steel Co.	Massillon, Ohio	W
486	600	500	440	25	16″ Merchant Mill	Geared	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
487	600	500	575	25	Brass Sheet Mill	Geared	1920	Baltimore Tube Co.	Baltimore, Md.	GE
488	600	500	575	25	Brass Sheet Mill	Geared	1920	Baltimore Tube Co.	Baltimore, Md.	GE
489	600–400	514–300	2200	60	Rod Mill	Direct	1912	Oliver Iron & Steel Co.	Pittsburgh, Pa.	GE
490	600	514	2200	60	Brass Mill	Geared	1922	Western Cartridge Co.	East Alton, Ill.	GE
491	600	585–325	550	40	16″ Merchant Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
492	600–500–400	600–500–400	2200	25	Merchant Mill, No. 10	Direct	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
493	600	600	4000	60	Brass Mill	Geared	1919	Bristol Brass Co.	Bristol, Conn.	GE
494	600	600	2200	60	Copper Mill	Geared	1920	American Brass Co.	Waterbury, Conn.	GE
495	600	600	440	60	16″ Merchant Mill		1920	Wayne Steel Co.		AC
496	600	600	2300	60		Coupled		Fulton Steel Corp.	Fulton, N. Y.	AC
497	600	600	2200	60	Brass Mill	Geared	1921	American Brass Co.	Waterbury, Conn.	GE
498	600–600	720–360	6600	60	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
499	600	885	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
500	600	885	2200	60	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
501	600	900	440	60	Copper Rod Mill	Geared	1920	Western Elec. Co.	Hawthorne, Ill.	GE

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
502	600	900	550	60	Brass Mill	Geared	1920	American Brass Co.	Ansonia, Conn.	GE
503	600	900	440	60	Copper Mill	Geared	1923	Am. Insulated Wire & Cable Co.	Chicago, Ill.	GE
504	650	160	440	60	14″ Guide Mill	Coupled		Withrow Steel Co.	Neville Island, Pa.	AC
505	650	184	6600	25	18″ Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
506	650	184	6600	25	14″ Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
507	650	200	440	60	14″ Guide Mill	Coupled		Withrow Steel Co.	Neville Island, Pa.	AC
508	650	210	6600	25	12″ Merchant Mill	Geared	1909	Indiana Steel Co.	Gary, Ind.	W
509	650	293	2200	60	9″ Merchant Mill	Rope	1919	Harrisburg Pipe & Pipe Bending Co.	Harrisburg, Pa.	W
510	650	500	6600	25	10″ Merchant Mill	Direct	1916	Illinois Steel Co.	Gary, Ind.	GE
511	650	500	6600	25	10″ Merchant Mill	Direct	1916	Illinois Steel Co.	Gary, Ind.	GE
512	650	750	2200	25			1913	Bethlehem Steel Co.	Johnstown, Pa.	AC
513	650	750	2200	25				Bethlehem Steel Co.	Johnstown, Pa.	AC
514	700	86	450	d.c.	Shear Intensifier	Direct	1918	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
515	700	135–360	240	d.c.	Merchant Mill	Direct	1923	Atlas Steel Corporation	Dunkirk, N. Y.	W
516	700	150	2200	60	Piercing Mill	Rope	1916	Ohio Seamless Tube Co.	Shelby, Ohio	GE
517	700	187	2200	25	14″ Merchant Mill	Direct	1920	Donner Steel Co.	Buffalo, N. Y.	GE
518	700	250	2200	25	18″ Bar Mill	Rope	1911	Dillworth Porter Co.	Pittsburgh, Pa.	GE
519	700	300	3300	25			1922	Woodward Iron Co.	Woodward, Ala.	AC
520	700	300–400	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
521	700	320	2200	60	Sheet and Jobbing Mill	Direct	1917	Carbon Steel Co.	Pittsburgh, Pa.	W
522	700	360	440	60	Brass Mill	Chain		Detroit Copper & Brass Co.	Detroit, Mich.	AC
523	700	364	2200	25	8″ Merchant Mill	Direct	1912	Laclede Steel Co.	Alton, Ill.	W
524	700	390	2200	60	18″ Bar Mill	Geared	1922	Dilworth Porter Co.	Pittsburgh, Pa.	W
525	700–600–400	400–300–200	2200	25	Merchant Mill, No. 10	Direct	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
526	700–600–400	400–300–200	1200	25	Merchant Mill, No. 10	Belt		Bethlehem Steel Co.	Lackawanna, N. Y.	GE
527	700	480–290	2200	25	12″ Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	W
528	700	502	2200	60	Cold Rolling Mill	Direct	1919	Carnahan Tin Plate & Steel Co.	Canton, Ohio	W
529	700	585	2200	60	Copper Rod Mill	Geared	1922	Eugene F. Phillips Elec. Wks., Ltd.	Montreal, Que.	W
530	700	600		60	14″ Bar Mill	Coupled	1921	Universal Steel Co.	Bridgeville, Pa.	CW
531	700	730–490	4000	25	14″ Merchant Mill	Geared	1918	Atlas Steel Corporation	Dunkirk, N. Y.	W
532	700	735	4000	25	14″ Merchant Mill	Geared	1921	Atlas Steel Corporation	Dunkirk, N. Y.	W
533	700	735	440	25	Copper Rolling Mill	Geared	1924	Baltimore Cop.Smelt. & Rolling Co.	Baltimore, Md.	W
534	700	735	440	25	Copper Rolling Mill	Geared	1924	Baltimore Cop.Smelt. & Rolling Co.	Baltimore, Md.	W
535	700	735	440	25	Copper Rolling Mill	Geared	1924	Baltimore Cop.Smelt. & Rolling Co.	Baltimore, Md.	W
536	700	875	2200	60	Cont. Hoop (Rough). Mill	Geared	1920	Connors Steel Co.	Birmingham, Ala.	W
537	700	875	2200	60	Cont. Hoop (Intermed.)	Geared	1920	Connors Steel Co.	Birmingham, Ala.	W
538	700	880–530	2200	60	10″ Finishing Mill	Geared	1923	Crucible Steel Works of America, Park Works		W
539	750	94	2200	25	Sheet Mill	Rope	1912	West Penn. Steel Co.	Brackenridge, Pa.	GE
540	750	100	2200	25	Tin Mill, Cold Rolls	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
541	750	100	2200	25	Tin Mill, Cold Rolls	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
542	750	120–210	250	d.c.	14″ Finishing Mill	Coupled	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
543	750	120–210	250	d.c.	14″ Finishing Mill	Coupled	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
544	750	125	2200	25	Tin Mill, Cold Rolls	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
545	750	125	2200	25	Tin Mill, Cold Rolls	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
546	750	130	550	d.c.	Wheel Mill	Direct	1915	Carnegie Steel Co.	McKees Rocks, Pa.	GE
547	750	160	550	d.c.	Wheel Mill	Direct	1916	Edgewater Steel Co.	Oakmont, Pa.	GE
548	750	160	550	d.c.	Wheel Mill	Direct	1916	Edgewater Steel Co.	Oakmont, Pa.	GE
549	750	160	550	d.c.	Wheel Mill	Direct	1919	Edgewater Steel Co.	Oakmont, Pa.	GE
550	750–750	225–168	440	60	Bar Mill	Coupled	1921	Simmons Mfg. Co.	Kenosha, Wis.	AC
551	750–750	235–325	230	d.c.	Piercing Mill	Geared	1914	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	GE
552	750	240	2200	60	Sheet Mill, Cold Rolls	Geared	1919	Wheeling Steel Corp.	Stuebenville, Ohio	GE
553	750	250	2200	25	Bar Mill	Geared	1914	Bethlehem Steel Co.	Johnstown, Pa.	AC
554	750	250	2200	60	Tin Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
555	750	250	440	25	Bar Mill	Coupled	1920	Simonds Mfg. Co.	Lockport, N. Y.	AC
556	750	257		60	10″ Strip Mill	Coupled	1923	Pittsburgh Steel Co.	Glassport, Pa.	CW
557	750	277	2200	60	18″ Merchant Mill	Geared	1915	Pacific Coast Steel Co.	San Francisco, Cal.	GE
558	750	295	6600	25	Seamless Mill	Geared	1923	Gary Tube Company	Gary, Ind.	W
559	750	300–600	230	d.c.	Cold Rolling Mill	Geared	1924	International Nickel Co.	Huntington, W. Va.	AC
560	750	353	2200	60	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
561	750	353	2200	60	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
562	750	353	2200	60	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
563	750	353	2200	60	Piercing Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
564	750	353	2200	60	Piercing Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
565	750	353	2200	60	Piercing Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
566	750	353	4600	60	Brass Mill	Geared	1924	Scoville Mfg. Co.	Waterbury, Conn.	W
567	750–625–460	360–300–220	6600	25	12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
568	750	360	4600	60			1921	Detroit Copper & Brass Co.	Detroit, Mich.	AC
569	750–750	360–860	600	d.c.	14″ Continuous Mill	Geared	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
570	750	443	4600	60		Coupled	1921	Detroit Copper & Brass Co.	Detroit, Mich.	AC
571	750–600–440	473–375–278	6600	25	12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
572	750	505	2200	60		Geared	1924	Kansas City Bolt & Nut Co.	Kansas City, Mo.	AC
573	750	514	2200	60	Wire Rod Mill	Geared	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
574	750	514	440	60	14″ Merchant Mill	Geared	1920	Withrow Steel Co.	Neville Island, Pa.	AC
575	750	514	550	60	10″ and 9″ Copper Mills	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
576	750	514	550	60	10″ and 9″ Copper Mills	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
577	750	600	4000	60	Brass Mill	Geared	1919	Bristol Brass Co.	Bristol, Conn.	GE
578	750	720	2200	60	Zinc Rolling Mill	Geared	1923	American Zinc Products Co.	Greencastle, Ind.	GE
579	800	0–37–70	500	d.c.	Plate Mill	Coupled	1919	Universal Rolling Mill Co.	Bridgeville, Pa.	AC
580	800	94	2200	25	18″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
581	800	100	6600	25	16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
582	800	109	2200	60	2-21″ Rolls	Coupled	1924	Globe Steel Tube Co.	Milwaukee, Wis.	AC
583	800	163	2200	25	22″ Merchant Blooming	Rope	1905	Ontario Iron & Steel Co.	Welland, Ont.	W
584	800	200–300	500	d.c.	Piercing Mill	Rope	1913	Pittsburgh Steel Products Co	Monessen, Pa.	W
585	800	200–300	500	d.c.	Piercing Mill	Direct	1912	Pittsburgh Steel Products Co.	Monessen, Pa.	W
586	800–800	200–400	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
587	800–800	214–167	6600	25	16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
588	800	214	2200	25	Sheet Mill	Geared	1919	American Sheet & Tin Plate Co.	Gary, Ind.	GE
589	800	214	2200	25	Sheet Mill	Geared	1919	American Sheet & Tin Plate Co.	Gary, Ind.	GE
590	800	220–150	2200	25	12″ Bar (Finishing) Mill	Direct	1919	Scullin Steel Co.	St. Louis, Mo.	W
591	800	225	2200	60	Roughing Mill	Geared	1916	Standard Seamless Tube Co.	Economy, Pa.	GE
592	800–800	231–462	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
593	800	250–500	230	d.c.	14″ and 9″ Hoop Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
594	800	250	2200	60	Piercing Mill	Geared	1915	Timken Roller Bearing Co.	Canton, Ohio	W
595	800	250	2200	60	22″ Bar Mill	Rope	1915	Timken Roller Bearing Co.	Canton, Ohio	W
596	800–800	256–512	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
597	800	257	2200	60	Bar Mill	Geared	1914	Standard Seamless Tube Co.	Economy, Pa.	GE
598	800	257	2200	60	12″ Rod Mill	Belt	1915	Crucible Steel Co. of America	Harrison, N. J.	GE
599	800	257	2200	60	18″ Merchant Mill	Geared	1919	Columbia Steel Co.	Pittsburgh, Cal.	GE
600	800	268	2200	60	14″–10″ Merchant Mill	Rope	1912	United Alloy Steel Corporation	Canton, Ohio	W
601	800–800	275–550	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
602	800	277	2200	60	Bar Mill	Geared	1918	Pacific Coast Steel Co.	San Francisco, Calif.	AC
603	800	292	2200	25	18″ Tandem Billet Mill	Direct	1912	Laclede Steel Co.	Alton, Ill.	W
604	800–800	315–210	575	d.c.	6″ Hot Strip Mill	Direct	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
605	800	320	440	60	9″ Merchant Mill	Belted	1914	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
606	800	320	440	60	10″ Merchant Mill	Belted	1914	Carnegie Steel Co. Painter Mills	Pittsburgh, Pa.	W
607	800	350	2200	60	24″ Bull Head Rolls of Sheet Bar Mill	Geared	1915	Central Steel Co.	Massillon, Ohio	W
608	800	350	2200	60	Billet Mill	Geared	1915	Milton Manufacturing Co.	Milton, Pa.	W
609	800	350	2200	60	Aluminum Mill	Geared	1915	U. S. Aluminum Co.	Edgewater, N. J.	W
610	800	350–700	600	d.c.	20″ Merchant Breakd'wn)	Geared	1921	Driver Harris	Harrison, N. J.	W

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
611	800	353	2200	60	12"-5 Stand Merch. Mill	Belt	1924	United Steel Company	Everett, Wash.	W
612	800	353	440	50	8" Copper Rod Mill	Direct	1923	Standard Underground Cable Co.	St. Louis, Mo.	W
613	800	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
614	800	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
615	800	367	2200	25	8" Merchant Mill	Direct	1918	Donner Steel Co.	Buffalo, N. Y.	W
616	800	370	650	d.c.	Aluminum Mill	Direct	1917	U. S. Aluminum Co.	Niagara Falls, N. Y.	W
617	800	370–400	650	d.c.	Aluminum Mill	Direct	1919	U. S. Aluminum Co.	Niagara Falls, N. Y.	W
618	800	375	2200	25	Sheet Mill, Cold Rolls	Geared	1919	Eastern Rolling Mills Co.	Baltimore, Md.	GE
619	800	375	2200	25	Merchant Mill	Geared	1920	Bethlehem Steel Co.	Johnstown, Pa.	GE
620	800–800	390–260	575	d.c.	6" Hot Strip Mill	Direct	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
621	800	400–600	600	d.c.	16" Merchant Mill	Geared	1921	Missouri Rolling Mills Co.	St. Louis, Mo.	W
622	800	410–720	230	d.c.	16" Merchant (Rough.)	Geared	1923	Timken Roller Bearing Co.	Canton, Ohio	W
623	800	440	2200	60	18" Merchant (Finishing)	Geared	1918	Canton Sheet Steel Co.	Canton, Ohio	W
624	800	443	2200	60	Roughing Mill	Coupled	1921	International Nickel Co.	Huntington, W. Va.	AC
625	800	450	2200	60	14" Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	AC
626	800	450	2200	60		Coupled	1919	Black Steel & Wire Co.	Kansas City, Mo.	AC
627	800	514	2200	60	Bar Mill	Geared	1919	Judson Mfg. Co.	Oakland, Calif.	AC
628	800	585–292	6600	60	16" Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
629	800–400	600–300	550	40	Bar Mill	Geared	1916	Ludlum Steel Co.	Watervliet, N. Y.	GE
630	800–400	600–300	550	40	Bar Mill	Geared	1917	Ludlum Steel Col.	Warervliet, N. Y.	GE
631	800	705	2200	60	12" Merchant Mill	Geared	1919	McConway-Torley Co.	Pittsburgh, Pa.	W
632	800–363	706–320	600	d.c.	10" Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
633	800–363	706–320	600	d.c.	10" Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
634	800–363	706–320	600	d.c.	10" Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
635	800–800–800	720–600–480	2200	60	12" Hot Strip Mill	Geared	1920	Canadian Elec. Steel Co.	Montreal, Canada	GE
636	800–800–800	720–600–480	2200	60	12" Hot Strip Mill	Geared	1920	Canadian Elec. Steel Co.	Montreal, Canada	GE
637	800	730–365	2200	50	22" Bar Mill	Geared	1916	Columbia Steel Co.	Los Angeles, Cal.	W
638	800	730–365	2200	50	12" Merchant Mill	Geared	1916	Columbia Steel Co.	Los Angeles, Cal.	W
639	800	730–485	2200	50	12" Merchant Mill	Geared	1919	Southern Calif. Iron & Steel Co.	Los Angeles, Cal.	W
640	800	870	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
641	800	870	2200	60	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
642	800	875–700	2200	60	16" Merchant Mill	Geared	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
643	800	880–490	2200	60	Bar Mill	Geared	1920	Knoxville Iron Co.	Knoxville, Tenn.	W
644	800	892–623	2200	60	20" Merchant (Finishing)	Geared	1919	Hoosier Rolling Mills Co.	Terre Haute, Ind.	W
645	800	900	440	60	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
646	800–800	900–720	2200	60	9" Merchant Mill	Geared	1923	Knoxville Iron Co.	Knoxville, Tenn.	GE
647	800–800	900–720	2200	60	9" Merchant Mill	Geared	1923	Knoxville Iron Co.	Knoxville, Tenn.	GE
648	850–570	214–143	6600	25	Merchant Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
649	850–850	214–187	6600	25	10" Merchant Mill	Rope	1916	Illinois Steel Co.	Gary, Ind.	GE
650	850–850	214–187	6600	25	10" Merchant Mill	Rope	1916	Illinois Steel Co.	Gary, Ind.	GE
651	850	505	2200	60	24" Bar (Roughing) Mill	Geared	1919	Central Steel Co.	Massillon, Ohio	W
652	850	710	2200	60	20" Blooming Mill	Geared	1923	Washburn Wire Co.	Phillipsdale, R. I.	W
653	900	94	2200	25	Jobbing Sheet Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
654	900	94	2200	25	Jobbing Sheet Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
655	900	163	2200	60	Wire Rod Mill	Coupled	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
656	900	163	2200	60		Rope	1919	Black Steel & Wire Co.	Kansas City, Mo.	AC
657	900–720	200–160	220	d.c.	Wheel Mill	Geared	1906	Bethlehem Steel Co.	Johnstown, Pa.	GE
658	900–900	214–150	2200	25	12" Merchant Mill	Direct	1910	Algoma Steel Co.	Sault Ste. Marie,Can.	GE
659	900–710–620	325–257–182	2300	60	10" Hoop Mill	Geared	1918	Acme Steel Goods Co.	Riverdale, Ill.	GE
660	900	900	440	60	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
661	975–375	650–250	600	d.c.	Rod (Roughing) Mill	Geared	1922	Atlantic Steel Co.	Atlanta, Ga.	W
662	975–510	865–450	600	d.c.	Rod (Finishing) Mill	Direct & Belt	1922	Atlantic Steel Co.	Atlanta, Ga.	W
663	1000	50–100	600	d.c.	24" Billet (Roughing)	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	W
664	1000	50–175	600	d.c.	24" Mill	Direct	1916	Central Steel Co.	Massillon, Ohio	W
665	1000	83	2200	25	Sheet Mill	Rope	1910	Follansbee Bros.	Follansbee, W. Va.	GE
666	1000	125	230	d.c.	Sheet Bar Mill	Geared	1920	Allegheny Steel Co.	Brackenridge, Pa.	GE
667	1000	133	2200	25	Structural (Finishing)	Direct	1910	Illinois Steel Co.	South Chicago, Ill.	W
668	1000	137	6600	25	Wheel Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	AC
669	1000	184	2200	25	16" Merchant Mill	Direct	1908	Bethlehem Steel Co.	Johnstown, Pa.	W
670	1000	209	6600	25	14" Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
671	1000	214–150	6400	25	24" Flat (Finishing) Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	W
672	1000	240	440	60	Sheet Mill		1918	Hudson Sh. & T. P. Co.	Marietta, Ohio	AC
673	1000	240	220	60	Tube Mill	Geared	1919	Globe Seamless Tube Co.	Milwaukee, Wis.	AC
674	1000	240		60	Tube Mill		1917	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	CW
675	1000	245	2200	25	30" Sheet Jobbing Mill	Rope	1910	American Rolling Mills Co.	Middletown, Ohio	W
677	1000	250	6600	25	Tin Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
678	1000	250	6600	25	Tin Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
679	1000	250	6600	25	Sheet Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
680	1000	250	6600	25	Sheet Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Point, Md.	GE
681	1000	250	2200	60	18" Merchant Mill	Geared	1918	Canton Sheet Steel Co.	Canton, Ohio	W
682	1000	250	2200	60	Sheet Mill	Geared	1920	American Rolling Mills Co.	Zanesville, Ohio	W
683	1000	250	2200	25	Sheet Mill		1920	Otis Steel Co.	Cleveland, Ohio	AC
684	1000	250	2200	25	Sheet Mill		1920	Otis Steel Co.	Cleveland, Ohio	AC
685	1000	277	2200	60	22" Bar Mill	Geared	1919	Pennsylvania Forge Co.	Philadelphia, Pa.	GE
686	1000	293	6600	25	14" Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
687	1000	295	2200	60	12" Cont. & 10" Merch.	Direct	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
688	1000	300	2200	25	10" Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	GE
689	1000	300–150	2200	60	12" Merchant Mill	Direct	1918	Central Steel Co.	Massillon, Ohio	W
690	1000	300	2200	60	Sheet Mill	Geared	1919	Superior Sheet Steel Co.	Canton, Ohio	GE
691	1000	300	2200	60	Sheet Mill	Geared	1919	Superior Sheet Steel Co.	Canton, Ohio	GE
692	1000	300	2200	60	Sheet Mill	Geared	1920	Milwaukee Rolling Mills Co.	Milwaukee, Wis.	GE
693	1000	300	2200	60	Sheet Mill	Geared	1920	Milwaukee Rolling Mills Co.	Milwaukee, Wis.	GE
694	1000	300	2200	25	Aluminum Rod Mill	Geared	1922	U. S. Aluminum Co.	Massena, N. Y.	GE
695	1000	300–400	230	d.c.	Lap Welding Mill	Coupled	1923	Gary Tube Co.	Gary, Ind.	AC
696	1000	360	2200	60			1921	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
697	1000	365	2200	50	Merchant Mill	Geared	1923	Columbia Steel Co.	Torrence, Cal.	W
698	1000	375	2200	25	Bar Mill	Geared	1913	Bethlehem Steel Co.	Johnstown, Pa.	AC
699	1200	240		60	Hot Sheet Mill	Coupled	1916	Standard Tin Plate Co.	Canonsburg, Pa.	
700	1000	375	2200	25	Wheel Mill	Geared	1913	Bethlehem Steel Co.	Johnstown, Pa.	AC
701	1000	375	4400	25	Merchant Mill	Geared	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
702	1000	435	2200	60		Geared	1924	American Tube & Stamping Co.	Bridgeport, Conn.	W
703	1000	435	2200	60		Geared	1924	American Tube & Stamping Co.	Bridgeport, Conn.	W
704	1000	450	2200	60	Piercing Mill	Geared	1918	Winchester Rep. Arms Co.	Bridgeport, Conn.	AC
705	1000	450	2200	60	Bar Mill	Rope	1919	Pacific Coast Steel Co.	Seattle, Wash.	AC
706	1000	450	2200	60	20" Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	AC
707	1000	518–800	250	d.c.	20" Merchant Mill	Geared	1919	National Farming Machinery, Ltd.	Montmagny, P. Q.	W
708	1000	590–495	6600	60	24" Structural Mill	Geared	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	W
709	1000	590–450	4000	60	14" Merchant Mill	Geared	1920	Calumet Steel Co.	Chicago, Ill.	W
710	1000	590–450	4000	60	14" Merchant Mill	Geared	1920	Calumet Steel Co.	Chicago, Ill.	W
711	1000	600	2200	60	16" Skelp Mill	Geared	1923	Elyria Iron & Steel Co.	Elyria, Ohio	GE
712	1000	705	2200	60	16" Strip Mill	Geared	1920	Central Steel Co.	Massillon, Ohio	W
713	1000	720	4000	60	18" 2-Stand Rerolling Rail Mill	Geared	1923	Buckeye Rolling Mill Co.	Newark, Ohio	GE
714	1000	725	2200	25	12" Merchant Mill	Geared	1922	Burlington Steel Co., Ltd.	Hamilton, Ont.	W
715	1100									
716	1500	91	2200	25	84" Plate (Fin.) Mill	Direct	1909	American Sheet & Tin Plate Co.	Gary, Ind.	W
717	1100	294–205	2200	60	20" Merchant Mill	Rope	1912	United Alloy Steel Corporation	Canton, Ohio	W
718	1150	250	6600	25	Jobbing Sheet Mill	Geared	1913	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
719	1180–955–705	560–450–336	2200	60	Rod Mill	Belt	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
720	1200–1200	150–250	230	d.c.	12" Merchant Mill	Direct	1920	Timken Roller Bearing Co.	Canton, Ohio	GE

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
721	1200	200	2200	60	Piercing Mill	Rope	1919	Ohio Seamless Tube Co.	Shelby, Ohio	GE
722	1200	214	2200	25	84″ Plate Mill	Geared	1913	Otis Steel Co.	Cleveland, Ohio	GE
723	1200	214	2200	25	Jobbing Sheet Mill	Geared	1913	Otis Steel Co.	Cleveland, Ohio	GE
724	1200	240	440	25	26″ Sheet Mill	Rope	1907	Seneca Iron & Steel Co.	Buffalo, N. Y.	W
725	1200	240	2200	60	Sheet Mill	Geared	1915	Empire Rolling Mills	Cleveland, Ohio	GE
726	1200	240	2200	60	Sheet Mill	Geared	1916	Mahoning Valley Steel Co.	Niles, Ohio	GE
727	1200	240	2200	60	Sheet Mill	Geared	1916	United Alloy Steel Corp.	Canton, Ohio	GE
728	1200	240	2200	60	Sheet Mill	Geared	1917	United Alloy Steel Corp.	Canton, Ohio	GE
729	1200	240	2200	60	Sheet Mill	Geared	1920	Republic Iron & Steel Co.	Youngstown, Ohio	GE
730	1200	240	2200	60	Sheet Mill	Geared	1920	Republic Iron & Steel Co.	Youngstown, Ohio	GE
731	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Co.	Canonsburg, Pa.	CW
731	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Co.	Canonsburg, Oa.	CW
732	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Co.	Canonsburg, Pa.	CW
733	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Co.	Canonsburg, Pa.	CW
734	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Co.	Canonsburg, Pa.	CW
736	1200	244	2200	25	Sheet Mill	Geared	1917	Bethlehem Steel Co.	Sparrows Pt., Md.	W
737	1200	244	2200	25	Sheet Mill	Geared	1917	Bethlehem Steel Co.	Sparrows Pt., Md.	W
738	1200	244	2200	25	Sheet Mill	Geared	1920	American Rolling Mills Co.	Middletown, Ohio	W
739	1200	244	2200	25	Sheet Mill	Geared	1920	American Rolling Mills Co.	Middletown, Ohio	W
740	1200	257	4600	60	Tube Mill	Rope & Coupled	1918	Detroit Seamless Tube Co.	Detroit, Mich.	AC
741	1200	292	2200	25	12″ Continuous and 10″ Merchant Mill	Direct & Rope	1912	Laclede Steel Co.	Alton, Ill.	W
742	1200	294	2200	60	Tube Rolling Mill	Geared	1915	National Tube Co.	Ellwood City, Pa.	W
743	1200	294	2200	60	Rolling Mill	Geared	1917	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind	W
744	1200	295	6600	60	Sheet Mill	Coupled	1922	Weirton Steel Co.	Weirton, W. Va.	AC
745	1200	295	6600	60	Sheet Mill	Coupled	1922	Weirton Steel Co.	Weirton, W. Va.	AC
746	1200-1150-800	300-214-150	2200	25	Merchant Mill, No.10	Geared	1916	Bethlehem Steel Co.	Lackawanna, N.Y.	GE
747	1200-1000-800	300-250-200	4400	25	14″ Merchant Mill	Direct	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
748	1200	300	4100	60	Sheet Mill	Geared	1920	Chapman Price Steel Co.	Indianapolis, Ind.	GE
749	1200	300	2200	60	Sheet Mill	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
750	1200	300	2200	60	Sheet Mill	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
751	1200	300	2200	60	Sheet Mill	Geared	1924	Thomas Sheet Steel Co.	Niles, Ohio	GE
752	1200	300	2200	60	Sheet Mill	Geared	1924	Thomas Sheet Steel Co.	Niles, Ohio	GE
753	1200	352	2200	60	Sheet Mill	Rope	1917	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
754	1200	360	2200	60	Morgan Wire Rod Mill	Geared	1918	Interstate Iron & Steel Co.	Chicago, Ill.	AC
755	1200	360	2200	60	30″ Sheet Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	AC
756	1200	360	2200	60	24″ Bar Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	AC
757	1200	367	2200	25	Cold Rolling Mill	Geared	1917	Bethlehem Steel Co.	Sparrows Pt., Md.	W
758	1200	368	2200	50	20″ Merchant Mill	Geared	1919	Southern Calif. Iron & Steel Co.	Los Angeles, Cal.	W
759	1200	400	650	d.c.	Aluminum Plate Mill	Geared	1915	Aluminum Company of America	Niagara Falls, N. Y.	GE
760	1200-1000-800	450-375-300	6600	25	8″ Hoop Mill, No. 8	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
761	1200-1000-800	450-375-300	6600	25	8″ Hoop Mill, No. 9	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
762	1200-1000-800	450-275-300	6600	25	8″ Bar Mill, No. 16	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
763	1200-1200-1200	450-360-270	2300	50	9″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
764	1200-1200-1200	450-360-270	2300	50	9″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
765	1200-1200-1200	450-360-270	2300	50	9″ Hot Strip Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
766	1200-1000-800	450-375-300	6600	25	18″ Band Mill, No. 13	Geared	1919	Carnegie Steel Co.	Youngstown, Ohio	GE
767	1200	485	6400	25	12″ Merchant Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
768	1200	500	2200	25	28″ Rail Mill	Geared	1914	Bethlehem Steel Co.	Steelton, Pa.	GE
769	1200	505-303	6600	50	16″ Band Mill	Geared	1919	Weirton Steel Co.	Weirton, W. Va.	W
770	1200	505	2200	60	29″ Bar (Roughing) Mill	Geared	1922	Youngstown Steel Co.	Youngstown, Ohio	W
771	1200	514	2200	60	Bar Mill	Geared	1917	Elyria Iron & Steel Co.	Elyria, Ohio	AC
772	1200	514	2200	60	Wire Rod Mill	Geared	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
773	1200	590	2200	60	22″ Strip Mill	Geared	1919	Harrisburg Pipe & Pipe Bending Co.	Harrisburg, Pa.	W
774	1200	590	2200	60	24″ Blooming Mill	Geared	1919	McConway-Torley Co.	Pittsburgh, Pa.	W
775	1200	590-450	2200	60	Duo and Bull Head Mill	Geared	1916	Central Steel Co.	Massillon, Ohio	W
776	1200	590-407	2200	60	20″ Merchant (Roughing)	Geared	1918	Hoosier Rolling Mill Co.	Terre Haute, Ind.	W
777	1250	175-400	230	d.c.	Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
778	1250-1250	175-350	600	d.c.	14″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
779	1250-1250	175-350	600	d.c.	14″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
780	1250	250	6600	25	Hot Tin Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
781	1250	250	6600	25	Hot Tin Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
782	1250	250	6600	25	Cold Tin Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
783	1250	294	6600	25	14″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
784	1250	375	2080	25	18″ Billet Mill	Geared	1918	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
785	1250	375	2080	25	18″ Billet Mill	Geared	1918	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
786	1250	375	2200	25	Merchants Bar Mill	Geared	1919	Valley Steel Co.	Milwaukee, Wis.	AC
787	1250-1000-650	650-500-325	2200	25	Rod Mill	Belt	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
788	1250	712-430	6600	50	3 Stand 12″ Mill	Coupled	1921	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
789	1300-900	214-140	2200	25	12″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
790	1300-1300	214-187	6600	25	10″ Merchant Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	GE
791	1300	360	2200	60	Wire Rod Mill	Coupled	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
793	1300	500	6600	25	Rod (Finishing) Mill	Rope	1912	American Steel & Wire Co.	Birmingham, Ala.	W
794	1350	600	2300	60	Copper Mill	Geared	1918	American Brass Company	Waterbury, Conn.	GE
795	1400	240	2200	60	Sheet Mill	Geared	1912	Apollo Steel Co.	Apollo, Pa.	GE
796	1400	505	2200	60	14″ Billet Mill	Geared	1917	Wickwire Spencer Steel Corp.	Palmer, Mass.	W
797	1400-945	600-405	2200	60	21″ Merchant Mill	Geared	1915	Bourne-Fuller Co.	Cleveland, Ohio	GE
798	1500	80	2200	60	Morgan Continuous Mill	Coupled	1920	Interstate Iron & Steel Co.	Chicago, Ill.	AC
799	1500	94	2200	25	18″ Merchant Mill	Direct	1910	Algoma Steel Co.	Sault Ste. Marie,Can.	GE
800	1500	100-125	220	d.c.	Light Rail Mill	Direct	1905	Carnegie Steel Co.	Bessemer, Pa.	W
801	1500	100-125	220	d.c.	Light Rail Mill	Direct	1905	Carnegie Steel Co.	Bessemer, Pa.	W
802	1500	125-250	230	d.c.	14″ Band Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
803	1500	125-250	240	d.c.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
804	1500	125-250	240	d.c.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
805	1500	133-81.5	6600	25	18″ Structural Mill	Direct	1915	Bethlehem Steel Co.	So. Bethlehem, Pa.	W
806	1500	150	6600	25	Wire Rod Mill	Coupled	1914	Illinois Steel Co.	Joliet, Ill.	AC
807	1500	150-300	230	d.c.	18-14″ Structural Mill	Direct	1924	Bethlehem Steel Co.	Johnstown, Pa.	AC
808	1500	150-300	230	d.c.	18-13″ Structural Mill	Direct	1924	Bethlehem Steel Co.	Johnstown, Pa.	AC
809	1500	182-162	6600	25	10″ Bar Mill	Direct & Rope	1913	Carnegie Steel Co.	Duquesne, Pa.	W
810	1500	187	2200	25	Sheet Mill	Chain	1914	National Enamel & Stamping Co.	Granite City, Ill.	AC
811	1500	210	2200	25	30″ Sheet Mill	Rope	1910	American Rolling Mill Co.	Middletown, Ohio	W
812	1500	218-145	6600	25	18″ Merchant Mill	Geared	1916	Carnegie Steel Co.	Duquesne, Pa.	W
813	1500	234	2200	60	Sheet Mill	Geared	1915	Canton Sheet & Steel Co.	Canton, Ohio	W
814	1500	234	2200	60	Sheet Mill	Geared	1916	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
815	1500	234	220	60	26″ Sheet Bar Mill	Geared	1916	Canton Sheet Steel Co.	Canton, Ohio	W
816	1500	234	2200	60	Sheet Mill	Geared	1917	Liberty Steel Co.	Warren, Ohio	W
817	1500	234	2200	60	Sheet Mill	Geared	1919	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
818	1500	234	2200	60	10″ Rod Mill	Geared	1921	Columbia Steel Co.	Pittsburgh, Cal.	W
819	1500	240	2200	60	Sheet Mill	Geared	1919	Follensbee Bros.	Toronto, Ohio	AC
820	1500	240	2200	60	Sheet Mill	Geared	1919	Follensbee Bros.	Toronto, Ohio	AC
821	1500	240	2200	60	Sheet Mill		1920	Canton Sheet Steel Co.	Canton, Ohio	AC
822	1500	240	2200	60	Sheet Mill	Geared	1922	United Alloy Steel Corp.	Canton, Ohio	GE
823	1500	250	2200	25	Sheet Mill	Geared	1919	Eastern Rolling Mills Co.	Baltimore, Md.	GE
824	1500	250	2200	25	Sheet Mill	Geared	1919	Eastern Rolling Mills Co.	Baltimore, Md.	GE
825	1500	257	2200	25	10″ Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE
826	1500	270	2200	60	Sheet Mill	Geared	1914	Youngstown Sheet & Tube Co.	Warren, Ohio	W
827	1500	270	2200	60	24″ Sheet Bar & Billet Mill	Geared	1914	Central Steel Co.	Massillon, Ohio	W
828	1500	270	2200	60	Lamberton Rod Mill	Geared	1915	United Alloy Steel Corporation	Canton, Ohio	W
829	1500	270	2200	60	22″ Bar and Billet Mill	Geared	1918	Central Steel Co.	Massillon, Ohio	W

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
830	1500	277	2200		22″ Ske p Mill	Direct	1924	Bethlehem Steel Corp.	Coatesville, Pa.	GE
831	1500–1500	280–420	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
832	1500–1500	280–420	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
833	1500–1500	280–420	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
834	1500	295	2200	60	Sheet Mill	Geared	1924	Kansas City Bolt & Nut Co.	Kansas City, Mo.	AC
835	1500	300	4600	25	Sheet Mill	Geared	1922	Michigan Steel Corp.	Detroit, Mich.	GE
836	1500	300	4600	60	Sheet Mill	Geared	1924	Michigan Steel Corp.	Detroit, Mich.	GE
837	1500	355	2200	60	35″ Blooming Mill	Geared	1924	Timken Roller Bearing Co.	Canton, Ohio	AC
838	1500	360–240	6600	25	12″ Merchant Mill	Rope	1916	Carnegie Steel Co.	Duquesne, Pa.	W
839	1500	360	6400	25	Billet Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
840	1500	360	2200	60	10″ Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE
841	1500–1250–1000	360–300–240	2200	25	28″ Rail Mill	Geared	1920	Bethlehem Steel Co.	Steelton, Pa.	GE
842	1500	360	4000	60	Sheet Mill	Geared	1923	Metal & Thermit Corp.	So.San Francisco,Cal.	GE
843	1500	360	2200	60	Sheet Mill	Geared	1923	Columbia Steel Co.	Pittsburgh, Cal.	GE
844	1500	368	2200	25	Sheet Bar (Finishing) Mill	Geared	1923	Inland Steel Co.	Chicago, Ill.	W
845	1500–1125	375–281	2200	25	10″ Merchant Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
846	1500	375	2200	25	26″ 3 high Blooming Mill	Geared	1920	Atlas Crucible Steel Co.	Dunkirk, N. Y.	GE
847	1500	440	2200	60	22″ Bar Mill	Geared	1919	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
848	1500	450	2200	30	3 High Skelp Mill	Geared	1915	Spang Chalfant Co.	Etna, Pa.	GE
849	1500–1200–1500	450–360–270	2300	60	16″ Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
850	1500	450	2200	60	Roughing Mill	Geared	1919	Pacific Coast Steel Co.	San Francisco, Calif.	AC
851	1500	450	2200	60	Bar Mill	Rope	1919	Pacific Coast Steel Co.	Seattle, Wash.	AC
852	1500	470–510	230	d.c.	Rod Mill	Direct	1923	John A. Roebling Sons	New York, N. Y.	W
853	1500	491	6600	25	14″ Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
854	1500	505	6600	60	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
855	1500	257–508	6600	60		Coupled	1924	Weirton Steel Co.	Weirton, W. Va.	AC
856	1500	508	6600	60	Steel Mill	Geared	1924	Weirton Steel Co.	Weirton, W. Va.	AC
857	1500	514	2200	60	Wire Rod Mill	Coupled	1917	Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
858	1500	514	6600	60	Hot Strip Mill	Geared	1917	Weirton Steel Co.	Weirton, W. Va.	AC
859	1500–1500	514–237	6600	60	Hot Strip Mill	Geared	1917	Weirton Steel Co.	Weirton, W. Va.	AC
860	1500	593	6600	60	6 Stand 11″ Mill	Coupled	1921	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
861	1500	600	2200	60	Light Rail Mill	Geared	1919	West Virginia Rail Co.	Huntington, W. Va.	AC
862	1500	705	2200	60	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
863	1500	705	2200	60	Srtip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
864	1500	705	2200	60	24″ Bar (Finishing) Mill	Geared	1922	Youngstown Steel Co.	Youngstown, Ohio	W
865	1500	705	2200	60		Coupled	1923	Bethlehem Steel Corp.	Coatesville, Pa.	AC
866	1500	705	2200	60	22″ Bar Mill	Geared	1924	Atchison, Topeka & Sante Fe Ry.	San Francisco, Cal.	AC
867	1500	735	2200	25		Geared	1923	Scullin Steel Co.	St. Louis, Mo.	AC
868	1500	890–540	6600	60	4 Stand 12″ Mill	Coupled	1921	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
869	1600	94	2200	25	Sheet Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
870	1660	94	2200	25	Sheet Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
871	1600	94	2200	25	Sheet Mill	Rope	1913	American Sheet & Tin Plate Co.	Gary, Ind.	GE
872	1600	94	2200	25	Sheet Mill	Rope	1913	American Sheet & Tin Plate Co.	Gary, Ind.	GE
873	1600	94	2200	25	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
874	1600	94	2200	25	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
875	1600	94	2200	25	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
876	1600	94	2200	25	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
877	1600	150	6600	25		Direct	1912	Pittsburgh Crucible Steel Co.	Pittsburgh, Pa.	GE
878	1600	210	2200	25	Sheet Mill	Geared	1912	Inland Steel Co.	Indiana Harbor, Ind.	W
879	1600	210–420	525	d.c.	Rod Mill	Geared	1913	Steel Company of Canada	Hamilton, Ont.	W
880	1600	210–420	525	d.c.	Rod Mill	Geared	1913	Steel Company of Canada	Hamilton, Ont.	W
881	1600	214	2200	25	84″ Plate Mill	Geared	1913	Otis Steel Co.	Cleveland, Ohio	GE
882	1600	240	2200	60	Sheet Mill	Geared	1919	Falcon Steel Co.	Niles, Ohio	GE
883	1600	244	2200	25	84″ Plate Mill (Roughing)	Geared	1912	Alan Wood Iron & Steel Co.	Ivy Rock, Pa.	W
884	1600	244	2200	25	84″ Plate Mill (Finishing)	Geared	1912	Alan Wood Iron & Steel Co.	Ivy Rock, Pa.	W
885	1600	250	440	25	Sheet Mill	Geared	1914	Seneca Iron & Steel Co.	Buffalo, N. Y.	GE
886	1600	257	2200	60	14″ Cont. Billet Mill	Geared	1912	Atlantic Steel Co.	Atlanta, Ga.	GE
887	1600	270	2200	60	Sheet Mill	Geared	1916	Wheeling Steel Corporation	Wheeling, W. Va.	W
888	1600	270	2200	60	Sheet Mill	Geared	1916	Wheeling Steel Corporation	Portsmouth, Ohio	W
889	1600	280	2200	60	Continuous Billet Mill	Geared	1913	Steel Company of Canada	Hamilton, Ont.	W
890	1600	500	6600	25	Rod (Finishing) Mill	Rope	1910	American Steel & Wire Co.	Birmingham, Ala.	W
891	1600	600	2200	60	Piercing Mill	Geared	1921	Standard Seamless Tube Co.	Pittsburgh, Pa.	GE
892	1650–1500–1350	413–375–337	6600	25	10″ Bar Mill, No. 10	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
893	1700–1700	90–140	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
894	1700–1700	90–205	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
895	1700	214	2200	25	Sheet Mill	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
896	1700	214	2200	25	Tin Mill	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
897	1700	214	2200	25	Tin Mill	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
898	1700	214	2200	25	Tin Mill	Geared	1918	American Sheet & Tin Plate Co.	Gary, Ind.	GE
899	1700	214	2200	25	Tin Mill	Geared	1918	American Sheet & Tin Plate Co.	Gary, Ind.	GE
900	1700	214	2200	25	Tin Mill	Geared	1918	American Sheet & Tin Plate Co.	Gary, Ind.	GE
901	1700	214	2200	25	Tin Mill	Geared	1919	American Sheet & Tin Plate Co.	Gary, Ind.	GE
902	1750	70–120	600	d.c.	29″ Billet Mill	Direct	1916	Youngsto wnSteel & Tube Co.	Indiana Harbor, Ind.	W
903	1750	150–300	230	d.c.	18–14″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	AC
904	1800	40	600	d.c.	84″ Sheared Plate Mill	Direct	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
905	1800	75	6600	25	30″ Billet Mill	Direct	1914	Bethlehem Steel Co.	Bethlehem, Pa.	GE
906	1800–1800	115–230	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
907	1800–1800	115–230	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
908	1800–1800	115–230	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
909	1800	120–80	2200	25	Light Rail Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
910	1800	120–80	2200	25	Light Rail Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
911	1800	165–350	240	d.c.	Strip Mill	Direct	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
912	1800	165–350	240	d.c.	Strip Mill	Direct	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
913	1800	214	2200	25	6″ Hot Strip Mill	Rope	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
914	1800	235	2200	60	Sheet Mill	Geared	1915	Trumbull Steel Co.	Warren, Ohio	W
915	1800–1500–1200	240–200–160	2300	60	10″ Hoop Mill	Belt	1918	Acme Steel Good Co.	Riverdale, Ill.	GE
916	1800	240	2200	60	Sheet Mill	Geared	1920	Apollo Steel Co.	Apollo, Pa.	GE
917	1800–1800	250–125	6600	25	22″ Merchant Mill	Geared	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
918	1800	250	2200	60	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
919	1800	270	6600	60	Sheet Mill	Geared	1916	Andrews Steel Co.	Newport, Ky.	W
920	1800	270	6600	60	Sheet Mill	Geared	1916	Andrews Steel Co.	Newport, Ky.	W
921	1800	366	2200	25	22″ Billet & Struct. Mill	Geared	1919	Scullin Steel Co.	St. Louis, Mo.	W
922	1800–1800–1800	370–300–247	6600	60	Sheet Bar Mill	Geared	1920	American Rolling Mill Co.	Ashland, Ky.	GE
923	1800–1500–1200	450–375–300	6600	25	10″ Hoop Mill, No. 11	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
924	1800	500	6600	25	20″ Hot Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
925	1800	514	2200	60	Rod Mill	Geared	1923	Columbia Steel Co.	Pittsburgh, Cal.	GE
926	1850–1450–925	120–94–60	6600	25	16″ Hand Bar Mill	Direct	1921	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
927	1850	575–221	600	d.c.	Rod Mill	Direct & Belt	1922	Atlantic Steel Co.	Atlanta, Ga.	W
928	2000	50–100	600	d.c.	30″ Bar Mill	Direct	1919	Follansbee Brothers Co.	Toronto, Ohio	W
929	2000	68	6600	25	28″ Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
930	2000	75	2200	25	Blooming Mill	Direct	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
931	2000	83	6600	25	96″ Plate Mill	Coupled	1918	Youngstown Sheet & Tube Co.	Youngstown, Ohio	AC
932	2000	83	6600	25	84″ Plate Mill	Coupled	1918	Youngstown Sheet & Tube Co.	Youngstown, Ohio	AC
933	2000	94	2200	25	18″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
934	2000–2000–2000	100–83.3–65	6600	25	12″ Structural Mill	Direct	1916	Bethlehem Steel Co.	Bethlehem, Pa.	GE
935	2000	113	6600	25	12″ Merchant Mill	Direct	1909	Illinois Steel Co.	Gary, Ind.	W
936	2000	163–113	6600	25	10″ Merchant Mill	Direct	1909	Illinois Steel Co.	Gary, Ind.	W
937	2000–1700	210–680	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
938	2000	214	6600	25	40″ Rail Mill	Geared	1906	Illinois Steel Co.	Gary, Ind.	GE
939	2000	214	6600	25	40″ Rail Mill	Geared	1906	Illinois Steel Co.	Gary, Ihd.	GE

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
940	2000	214	6600	25	40″ Billet Mill	Geared	1907	Illinois Steel Co.	Gary, Ind.	GE
941	2000	214	6600	25	40″ Billet Mill	Geared	1907	Illinois Steel Co.	Gary, Ind.	GE
942	2000	234-161	2200	60	10″ Skelp (Finishing) Mil	Belt	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
943	2000	234	2200	60	Sheet Mill	Geared	1919	Newton Steel Co.	Newton Falls, Ohio	W
944	2000	234	2200	60	Tin Mill	Geared	1920	National Enam. & Stamping Co.	St. Louis, Mo.	W
945	2000	234	2200	60	Sheet Mill	Geared	1921	Newton Steel Co.	Newton Falls, Ohio	W
946	2000	234	2200	60	Sheet Mill	Geared	1923	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
947	2000	240	2200	60	32″ Blooming Mill	Geared	1915	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	GE
948	2000	240	2200	60	18″ Sheet Bar Mill	Geared	1920	National Enam. & Stamping Co.	Granite City, Ill.	GE
949	2000	240	2200	60	Sheet Mill	Geared	1919	Republic Iron & Steel Co.	Niles, Ohio	GE
950	2000	244	2200	25	90″ Plate Mill	Rope	1912	Inland Steel Co.	Indiana Harbor, Ind.	W
951	2000	250-150	2200	60	Morgan Continuous Mill	Coupled		Interstate Iron & Steel Co.	Chicago, Ill.	AC
952	2000-2000	250-161	6600	25	10″ Skelp Mill	Geared	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
953	2000	250	6600	25	Sheet Mill	Geared	1920	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
954	2000	250	6600	25	Sheet Mill	Geared	1920	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
955	2000	260-800	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
956	2000	294	6600	25	14″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
957	2000	350-234	2200	60	10″ Skelp (Roughing) Mill	Geared	1917	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
958	2000	375	2200	25	84″ Plate Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
959	2000	375	2200	25	Wheel Mill	Geared	1916	Bethlehem Steel Co.	Johnstown, Pa.	AC
960	2000-2000-1600	450-360-270	2200	60	16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
961	2000-2000-1600	450-360-270	2200	60	16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
962	2000-2000-1600	450-360-270	2200	60	16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
963	2000	505	6600	60	Plate Mill	Geared	1922	American Rolling Mills Co.	Ashland, Ky.	W
964	2000	505	6600	60	Plate Mill	Geared	1922	American Rolling Mills Co.	Ashland, Ky.	W
965	2000	600	6600	60	Sheet Mill	Geared	1924	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
966	2000	600	6600	60	Fin. Stand of 24″ Struc. Mill	Geared	1924	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
967	2070-1650-1205	235-187.5-137	6600	25	20″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
968	2100	50-125	700	d.c.	42″ Universal Plate Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
969	2100	47-120	700	d.c.	34″ Blooming Mill	Direct	1916	Penn Seaboard Steel Corporation	New Castle, Del.	W
970	2100-2100	150-310	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
971	2100-1600	150-460	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
972	2200	50-120	600	d.c.	40″ Universal Plate Mill	Direct	1919	Dominion Foundrys & Steel Co.	Hamilton, Ont.	W
973	2200	70-150	600	d.c.	28″ Blooming Mill	Direct	1920	Atlantic Steel Co.	Atlanta, Ga.	W
974	2200-2000-1800	275-250-225	6600	25	10″ Bar Mill, No. 15	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
975	2200	505-303	2200	60	18″ Bar (Finishing) Mill	Geared	1919	Central Steel Co.	Massillon, Ohio	W
976	2300-1300	115.4-65	6600	25	10″ Skelp Mill	Geared	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
977	2360-1880-1440	410-327-250	2200	60	Rod Mill	Geared	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
978	2400	500	6600	25	Wire Rod Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	AC
979	2470-1725-1235	430-300-215	2200	25	Rod Mill	Geared	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
980	2500	82	6600	60	28″ Structural Mill	Direct	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
981	2500	113-91	6600	25	12″ Merchant Mill	Geared	1909	Illinois Steel Co.	Gary, Ind.	W
982	2500	146	6600	25	16″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
983	2500	150	6600	25	28″ Billet Mill	Geared	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	GE
984	2500	184	6600	25	Skelp Mill	Rope	1908	National Tube Co.	Lorain, Ohio	W
985	2500	184	6600	25	Skelp Mill	Rope	1908	National Tube Co.	Lorain, Ohio	W
986	2500	235	2200	60	84″ Plate (Finishing) Mil	Geared	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
987	2500	240	2200	60	Sheet Mill	Geared	1919	Wheeling Steel Corp.	Stuebenville, Ohio	GE
988	2500	240	2200	60	24″ Sheet Bar Mill	Geared	1920	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	GE
989	2500	247	6600	25	Piercing Mill	Geared	1923	Gary Tube Co.	Gary, Ind.	W
990	2500	252	2200	60	Skelp Mill	Geared	1917	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
991	2500	252	2200	60	Skelp Mill	Geared	1917	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
992	2500	295	6600	25	16″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
993	2500	352-167	6600	60	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
994	2500	500	2200	60	22″ Bar Mill	Geared	1923	Phoenix Iron Co.	Phoenixville, Pa.	W
995	2600	81.5	6600	25	Rod (Roughing) Mill	Geared	1910	American Steel & Wire Co.	Birmingham, Ala.	W
996	2600	368	6400	25	Rod Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
997	2750-2240-1750	262-214-167	6600	25	12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
998	2750-2500-2250	275-250-225	6600	25	14″ Bar Mill, No. 14	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
999	2870-1435	400-200	600	d.c.	10″ Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
1000	2900	47-120	700	d.c.	34″ Blooming Mill	Direct	1917	Sharon Steel Hoop Co.	Youngstown, Ohio	W
1001	3000	91	2200	25	Struct. (Roughing) Mill	Geared	1910	Illinois Steel Co.	South Chicago, Ill.	W
1002	3000	125	6400	25	20″ Flat Mill	Coupled	1916	American Steel & Wire Co.	Cleveland, Ohio	AC
1003	3000	150	6600	25	Wire Rod Mill	Coupled	1920	Minnesota Steel Co.	Steelton, Minn.	AC
1004	3000	150-300	230	d.c.	18″14″ Structural Mill	Direct	1924	Bethlehem Steel Co.	Johnstown, Pa.	AC
1005	3000	150-300	230	d.c.	18-13″ Structural Mill	Direct	1924	Bethlehem Steel Co.	Johnstown, Pa.	AC
1006	3000-3000-3000	155-144-130	6600	60	24″ Structural Mill	Direct	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
1007	3000	184	6600	25	16″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
1008	3000-3000	200-360	600	d.c.	14″ Continuous Mill	Geared	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
1009	3000	209	6600	25	12″ & 16″ Merchant Mill	Geared	1913	Minnesota Steel Co.	Duluth, Minn.	W
1010	3000	235	2200	60	100″ Plate Mill	Geared	1922	National Enam. & Stamping Co.	St. Louis, Mo.	W
1011	3000	245	2200	25	90″ Plate Mill	Geared	1920	Inland Steel Co.	Indiana Harbor, Ind.	W
1012	3000	250	6600	25	18″ Cont. Billet Mill	Geared	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
1013	3000-2500-2000	300-250-200	6600	25	18″ Band Mill, No. 13	Direct	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
1014	3000-2500-2000	300-250-200	6600	25	12″ Hoop Mill, No. 12	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
1015	3000	325-485	600	d.c.	24″ Structural Mill	Geared	1923	Phoenix Iron Co.	Phoenixville, Pa.	W
1016	3000	354-212	2200	60	Skelp Mill	Geared	1920	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
1017	3000	360	6600	60	28″ Rail Mill	Geared	1919	Dominion Iron & Steel Co.	Sydney, N. S.	GE
1018	3000	375	2200	25	14″ Merchant Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
1019	3000	375	2200	25	18″ Billet Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
1020	3000	375	6600	25	24″ Sheet Bar Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
1021	3000	500	6600	25	26″ Rail Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
1022	3000	500	6600	25	26″ Rail Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
1023	3000	505-300	2200	60	12″ Merchant Mill	Geared	1920	United Alloy Steel Corporation	Canton, Ohio	W
1024	3200	50-120	700	d.c.	34″ Struct. (Rough). Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
1025	3200	50-120	700	d.c.	28″ Struct. (Fin.) Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
1026	3200	91	6600	25	18″ Merchant Mill	Geared	1909	Illinois Steel Co.	Gary, Ind.	W
1027	3200	91	6600	25	14″ Merchant Mill	Geared	1909	Illinois Steel Co.	Gary, Ind.	W
1028	3250	40	500	d.c.	36″ Blooming Mill	Direct	1916	American Rolling Mill Co.	Ashland, Ky.	GE
1029	3250	40	500	d.c.	34″ Blooming Mill	Direct	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
1030	3250	94	6600	25	18″ Sheet Bar Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
1031	3500	70-100	525	d.c.	32″ Blooming Mill	Direct	1913	Steel Company of Canada	Hamilton, Ont.	W
1032	3500	50-75	700	d.c.	34″ Blooming Mill	Direct	1914	Central Steel Co.	Massillon, Ohio	W
1033	3500	50-120	700	d.c.	35″-Structural Mill	Direct	1924	Bethlehem Steel Co.	Lackawanna, N. Y.	W
1034	3500	92	2200	60	18″ Sheet Bar Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
1035	3500	92	2200	60	21″ Sheet Bar Mill	Direct	1918	Trumbull Steel Co.	Warren, Ohio	GE
1036	3500	150-300	230	d.c.	18-14″ Structural Mill	Direct	1924	Bethlehem Steel Co.	Lackawanna, N. Y.	AC
1037	3600	40-90	600	d.c.	35″ Blooming Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	W
1038	3600	40-90	600	d.c.	40″ Blooming Mill	Direct	1917	Illinois Steel Co.	Gary, Ind.	W
1039	4000	0-150	575	d.c.	36″ Universal Plate Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
1040	4000	50-120	700	d.c.	34″ Blooming Mill	Direct	1924	Donner Steel Co.	Buffalo, N. Y.	GE
1041	4000	80	650	d.c.	30″ Universal Skelp Mill	Direct	1922	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
1042	4000	0-80	1200	d.c.	34″ Blooming Mill	Coupled	1912	Algoma Steel Co.	Saulte Ste. Marie, Can.	AC
1043	4000	82	6600	60	110″ Plate Mill	Direct	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
1044	4000	82	6600	60	110″ Plate Mill	Direct	1918	Dominion Iron & Steel Corp.	Sydney, N. S.	GE
1045	4000	83	6600	25 cy.	110″ Plate Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
1046	4000	83	6600	25 cy.	24″ Cont. Billet Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
1047	4000	83	6600	25 cy.	110″ Plate Mill	Direct	1917	Carnegie Steel Co.	Homestead, Pa.	GE
1048	4000	83	6600	60 cy.	33″ Structural Mill	Direct	1920	Carnegie Steel Co.	Homestead, Pa.	GE

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1049	4000	93	6600	60 cy.	18″ Continuous Bar Mill	Direct	1919	Weirton Steel Co.	Weirton, W. Va.	W
1050	4000	93	6600	60 cy.	21″ Continuous Bar Mill	Direct	1919	Weirton Steel Co.	Weirton, W. Va.	W
1051	4000	147	6600	25 cy.	20″ Merchant Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	W
1052	4000	200	6600	60 cy.	120″ Plate Mill	Geared	1920	Worth Steel Co.	Claymont, Del.	GE
1053	4000	360	2200	60 cy.	21″ Sheet Bar Mill	Geared	1917	Sharon Steel Hoop Co.	Lowellville, Ohio	GE
1054	4200	93	2200	60 cy.	Continuous Bar Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
1055	4500–4500	67 5–110	500	d.c.	14″ Merchant Mill	Geared	1923	Ford Motor Co.	Detroit, Mich.	GE
	4500–4500	500–300	2200	25 cy.	14″ Merchant Mill	Geared	1923	Inland Steel Co.	Indiana Harbor, Ind.	GE
1056	5000	40–120	600	d.c.	40″ Blooming Mill	Direct	1916	National Tube Co.	Lorain, Ohio	W
1057	5000	40–120	600	d.c.	35″ Blooming Mill	Direct	1916	Youngstown Sheet & Tube	Indiana Harbor, Ind.	W
1058	5000	40–120	600	d.c.	35″ Blooming Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
1059	5000	50–120	700	d.c.	36″ Rev. Rougher Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
1060	5000	75–120	700	d.c.	48″ Universal Plate Mill	Direct	1923	Bethlehem Steel Co.	Lackawanna, N. Y.	W
1061	5000	75–150	700	d.c.	28″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	W
1062	5000	197	2200	60 cy.	132″ Plate Mill	Geared	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
1063	5000	370	6600	25 cy.	132″ Plate Mill	Geared	1923	Illinois Steel Co.	South Chicago, Ill.	W
1064	5000	370	6600	25 cy.	90″ Plate Mill	Geared	1923	Illinois Steel Co.	South Chicago, Ill.	W
1065	5000	450	2300	60 cy.	18″ Continuous Sheet Bar and Billet Mill	Geared	1919	Wheeling Steel Corporation	Portsmouth, Ohio	GE
1066										
1067	5000	595	6600	60 cy.	28″ 3 Stand Rail	Coupled	1921	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
1068	5000	594	6600	60 cy.	Sheet & Billet Mill	Geared	1924	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	GE
1069	5500–4400–3400	170–136–105	6600	25 cy.	20″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
1070	5500	370	6600	25 cy.	16″ Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
1071	5750	94	6600	25 cy.	21″ Cont. Billet Mill	Direct	1914	McKinney Steel Co.	Cleveland, Ohio	GE
1072	5750	94	6600	25 cy.	18″ Bar Mill	Direct	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
1073	5750	94	6600	25 cy.	21″ Bar Mill	Direct	1921	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
1074	5750	94	6600	25 cy.	18″ Billet Mill	Geared	1923	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
1075	5750	94	6600	25 cy.	21″ Billet Mill	Geared	1923	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
1076	6000	40–120	600	d.c.	44″ Blooming Mill	Direct	1919	Bethlehem Steel Co.	Steelton, Pa.	W
1077	6000	75	6600	25 cy.	40″ Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
1078	6000	82	6600	25 cy.	28″ Rail Mill	Geared	1914	Minnesota Steel Co.	Duluth, Minn.	W
1079	6000	83	6600	25 cy.	28″ Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
1080	6000	83	6600	25 cy.	32″ Billet Mill	Direct	1907	Illinois Steel Co.	Gary, Ind.	GE
1081	6000	83	6600	25 cy.	24″ Billet Mill	Direct	1907	Illinois Steel Co.	Gary, Ind.	GE
	6000	83	6600	25 cy.	18″ Billet Mill	Direct	1907	Illinois Steel Co.	Gary, Ind.	GE
1082	6000	83	6600	25 cy.	18″ Sheet Bar Mill	Direct	1910	Illinois Steel Co.	Gary, Ind.	GE
1083	6000	88	6600	25 cy.	28″ Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
1084	6000	98	6600	25 cy.	28″–32″ Structural Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
1085	6250	368	2200	25 cy.	24″ Cont. Billet Mill	Geared	1922	Inland Steel Co.	Indiana Harbor, Ind.	W
1086	6500	40–120	600	d.c.	40″ Blooming Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
1087	6500	50	600	d.c.	36″ Blooming Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
1088	6500	50	600	d.c.	40″ Blooming Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
1089	6500	50	600	d.c.	40″ Blooming Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
1090	6500–4500	107–53	6600	25 cy.	60″ 3 High Universal Plate Mill	Direct	1909	Illinois Steel Co.	Gary, Ind.	GE
1091										
1092	7000	0–50–120	700	d.c.	44″ Blooming Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
1093	7000	50–120	700	d.c.	40″ Rev. Blooming Mill	Direct	1923	Bethlehem Steel Co.	Lackawanna, N. Y.	W
1094	7000	50–120	700	d.c.	40″ Blooming Mill	Direct	1924	International Harvester Co.	Chicago, Ill.	W
1095	7000	55	900	d.c.	45″ Blooming Mill	Direct	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
1096	7000	50 100	700	d.c.	60″ Universal Plate Mill	Direct	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	W
1097	7000	81.7	6600	25 cy.	160″ Plate Mill	Direct	1917	Illinois Steel Co.	Gary, Ind.	W
1098	8000	150	600	d.c.	28″ Rail Mill	Direct	1917	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
1099	8000	240	13200	60 cy.	Interrupted Continuous Blooming Mill	Geared	1923	Ford Motor Co.	Detroit, Mich.	GE

BLOOMING MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd By
1	500	190	230	d.c.	24″ Blooming Mill	Geared	1910	Sharon Steel Hoop Co.	Sharon, Pa.	GE
2	850	710	2200	60 cy.	20″ Blooming Mill	Geared	1923	Washburn Wire Co.	Phillipsdale, R. I.	W
3	1200	585	2200	60 cy.	24″ Blooming Mill	Geared	1919	McConway Torley Co.	Pittsburgh, Pa.	W
4	1500	355	2200	60 cy.	35″ Blooming Mill	Geared	1924	Timken Roller Bearing Co.	Canton, Ohio	W
5	1500	375	2200	25 cy.	36″ 3 High Blooming Mill	Geared	1920	Atlas Crucible Steel Co.	Dunkirk, N. Y.	GE
6	2000	75	2200	25 cy.	Blooming Mill	Direct	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
7	2000	240	2200	60 cy.	32″ Blooming Mill	Geared	1915	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	GE
8	2100	47–120	700	d.c.	34″ Rev. Blooming Mill	Direct	1916	Penn Seaboard Steel Corporation	New Castle, Del.	W
9	2200	70–150	600	d.c.	28″ Rev. Blooming Mill	Direct	1920	Atlantic Steel Co.	Atlanta, Ga.	W
10	2900	47–120	700	d.c.	34″ Rev. Blooming Mill	Direct	1917	Sharon Steel Hoop Co.	Youngstown, Ohio	W
11	3250	40	500	d.c.	36″ Blooming Mill	Direct	1916	American Rolling Mill Co.	Ashland, Ky.	GE
12	3250	40	500	d.c.	34″ Blooming Mill	Direct	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
13	3500	70–100	525	d.c.	32″ Rev. Blooming Mill	Direct	1913	Steel Company of Canada	Hamilton, Ont.	W
14	3500	50– 75	700	d.c.	34″ Rev. Blooming Mill	Direct	1914	Central Steel Co.	Massillon, Ohio	W
15	3600	40– 90	600	d.c.	35″ Rev. Blooming Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	W
16	3600	40– 90	600	d.c.	40″ Rev. Blooming Mill	Direct	1918	Illinois Steel Co.	Gary, Ind.	W
17	4000	0– 80	1200	d.c.	34″ Blooming Mill	Coupled		Algoma Steel Co.	Sault Ste. Marie,Can.	AC
18	5000	30–120	600	d.c.	40″ Rev. Blooming Mill	Direct	1916	National Tube Co.	Lorain, Ohio	W
19	5000	50–120	600	d.c.	35″ Rev. Blooming Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
20	5000	40–120	600	d.c.	35″ Rev. Blooming Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
21	6500	40–120	600	d.c.	40″ Rev. Blooming Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
22	6500	50	600	d.c.	36″ Blooming Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
23	6500	50	600	d.c.	40″ Blooming Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
24	6500	50	600	d.c.	40″ Blooming Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
25	7000	50–120	700	d.c.	40″ Rev. Blooming Mill	Direct	1923	Bethlehem Steel Co.	Lackawanna, N. Y.	W
26	7000	50–120	700	d.c.	44″ Blooming Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
27	7000	50–120	700	d.c.	40″ Blooming Mill	Direct	1924	International Harvester Co., Wisconsin Steel	Chicago, Ill.	W
28	7000	55	900	d.c.	45″ Blooming Mill	Direct	1917	Tenn. Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
29	8000	240	13200	60 cy.	Interrupted Continuous Blooming Mill	Geared	1923	Ford Motor Co.	Detroit, Mich.	GE

PLATE MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
2	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
3	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W

PLATE MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
4	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
5	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
6	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
7	300	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
8	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
9	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
10	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
11	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
12	500	200	500	d.c.	78" Rev. Brass Plate Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
13	500	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
14	500	575	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
15	600	885	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
16	600	885	2200	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
17	800	0–37–70	500	d.c.	Plate Mill	Coupled		Universal Rolling Mill Co.	Bridgeville, Pa.	AC
18	1000	50–175	600	d.c.	24" Rev. Universal Plate	Direct	1916	Central Steel Co.	Massillon, Ohio	W
19	1100–1500	91	2200	25 cy.	84" Plate (Finishing) Mill	Direct	1909	American Sheet & Tin Plate Co.	Gary, Ind.	W
20	1200	214	2200	25 cy.	84" Plate mill	Geared	1913	Otis Steel Co.	Cleveland, Ohio	GE
21	1600	214	2200	25 cy.	84" Plate Mill	Geared	1913	Otis Steel Co.	Cleveland, Ohio	GE
22	1600	244	2200	25 cy.	84" Plate (Rough.) Mill	Geared	1912	Alan Wood Iron & Steel Co.	Ivy Rock, Pa.	W
23	1600	244	2200	25 cy.	84" Plate (Finishing) Mill	Geared	1912	Alan Wood Iron & Steel Co.	Ivy Rock, Pa.	W
24	1800	40	600	d.c.	84" Reversing Plate Mill	Direct	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
25	2000	83	6600	25 cy.	96" Plate Mill	Coupled		Youngstown Sheet & Tube Co.	Youngstown, O.	AC
26	2000	83	6600	25 cy.	84" Plate Mill	Coupled		Youngstown Sheet & Tube Co.,	Youngstown, O.	AC
27	2000	244	2200	25 cy.	90" Plate Mill	Rope	1912	Inland Steel Co.	Indiana Harbor, Ind.	W
28	2000	375	2200	25 cy.	84" Plate Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
29	2000	505	6600	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
30	2000	505	6600	60 cy.	Plate Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
31	2100	50–125	700	d.c.	42" Rev. Univ. Plate Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
32	2200	50–120	600	d.c.	40" Rev. Univ. Plate Mill	Direct	1919	Dominion Foundrys & Steel Co.	Hamilton, Ont.	W
33	2500	235	2200	60 cy.	84" Plate (Finishing) Mill	Geared	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
34	3000	245	2200	25 cy.	90" Plate Mill	Geared	1920	Inland Steel Co.	Indiana Harbor, Ind.	W
35	3000	235	2200	60 cy.	100" Plate Mill	Geared	1922	Nat'l Enameling & Stamping Co.	St. Louis, Mo.	W
36	4000	0–150	575	d.c.	36" Rev. Univ. Plate Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
37	4000	82	6600	60 cy.	110" Plate Mill	Direct	1917	Tenn. Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
38	4000	83	6600	25 cy.	110" Plate Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
39	4000	83	6600	25 cy.	110" Plate Mill	Direct	1917	Carnegie Steel Co.	Homestead, Pa.	GE
40	4000	82	6600	60 cy.	110" Plate Mill	Direct	1918	Dominion Iron & Steel Corp.	Sydney, N. S.	GE
41	4000	200	6600	60 cy.	120" Plate Mill	Geared	1920	Worth Steel Co.	Claymont, Del.	GE
42	5000	75–100	700	d.c.	48" Rev. Univ. Plate Mill	Direct	1923	Bethlehem Steel Co.	Lackawanna, N. Y.	W
43	5000	197	2200	60 cy.	132" Plate Mill	Geared	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
44	5000	370	6600	25 cy.	132" Plate Mill	Geared	1922	Illinois Steel Co.	South Chicago, Ill.	W
45	5000	370	6600	25 cy.	90" Plate Mill	Geared	1922	Illinois Steel Co.	South Chicago, Ill.	W
46	6500–4500	107–53	6600	25 cy.	60" 3 High Univ. Plate	Direct	1909	Illinois Steel Co.	Gary, Ind.	GE
47	7000	0–100	700	d.c.	60" Rev. Univ. Plate Mill	Direct	1919	Bethlehem Steel Co.	Sparrows Point, Md.	W
48	7000	81.7	6600	25 cy.	160" Plate Mill	Direct	1916	Illinois Steel Co.	Gary, Ind.	W

RAIL AND STRUCTURAL MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	400	125	230	d.c.	12" Structural Mill	Direct	1919	Eastern Steel Co.	Pottsville, Pa.	W
2	1000	133	2200	25 cy.	Structural (Finish) Mill	Direct	1910	Illinois Steel Co.	South Chicago, Ill.	W
3	1000	590–495	6600	60 cy.	24" Structural Mill	Geared	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	W
4	1000	720	4000	60 cy.	18" 2-Stand Rerolling Rail Mill	Geared	1923	Buckeye Rolling Mill Co.	Newark, Ohio	GE
5	1200	500	2200	25 cy.	28" Rail Mill	Geared	1914	Bethlehem Steel Co.	Steelton, Pa.	GE
6	1500	100–125	220	d.c.	Light Rail Mill	Direct	1905	Carnegie Steel Co.	Bessemer, Pa.	W
7	1500	100–125	220	d.c.	Light Rail Mill	Direct	1905	Carnegie Steel Co.	Bessemer, Pa.	W
8	1500	133–81.5	6600	25 cy.	18" Structural Mill	Direct	1915	Bethlehem Steel Co.	Bethlehem, Pa.	W
9	1500	150–300	230	d.c.	18-14" Structural Mill	Direct	1924	Bethlehem Steel Corporation	Johnstown, Pa.	AC
10	1500	150–300	230	d.c.	18-13" Structural Mill	Direct	1924	Bethlehem Steel Corporation	Johnstown, Pa.	AC
11	1500 1250–1000	360–300–240	2200	25 cy.	28" Rail Mill	Geared	1920	Bethlehem Steel Co.	Steelton, Pa.	GE
12	1500	600	2200	60 cy.	Light Rail Mill	Geared		West Va. Rail Co.	Huntington, W. Va.	AC
13	1750	150–300	230	d.c.	18-14" Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	AC
14	1800	120–80	2200	25 cy.	Light Rail Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
15	1800	120–80	2200	25 cy.	Light Rail Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
16	1800	366	2200	25 cy.	22" Structural Mill	Geared	1919	Scullin Steel Co.	St. Louis, Mo.	W
17	1800	366	2200	25 cy.	22" Structural & Bar Mill	Geared	1919	Scullin Steel Co.	St. Louis, Mo.	W
18	2000–2000–2000	100–83.3–65	6600	25 cy.	12" Structural Mill	Direct	1916	Bethlehem Steel Co.	Bethlehem, Pa.	GE
19	2000	68	6600	25 cy.	28" Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
20	2000	214	6600	25 cy.	40" Rail Mill	Geared	1906	Illinois Steel Co.	Gary, Ind.	GE
21	2000	214	6600	25 cy.	40" Rail Mill	Geared	1906	Illinois Steel Co.	Gary, Ind.	GE
22	2000	600	6600	60 cy.	Fin. Stand of 24" Structural Mill	Geared	1924	Tenn. Coal, Iron & R.R. Co.	Fairfield, Ala.	GE
23	2500	82	6600	60 cy.	28" Structural Mill	Direct	1917	Tenn. Coal, Iron & R.R. Co.	Fairfield, Ala.	GE
24	3000	91	2200	25 cy.	Structural (Rough.) Mill	Geared	1910	Illinois Steel Co.	South Chicago, Ill.	W
25	3000	150–300	230	d.c.	18-14" Structural Mill	Direct	1924	Bethlehem Steel Corp.	Johnstown, Pa.	AC
26	3000	150–300	230	d.c.	18-13" Structural Mill	Direct	1924	Bethlehem Steel Corp.	Johnstown, Pa.	AC
27	3000–3000–3000	155–144–130	6600	60 cy.	24" Structural Mill	Direct	1917	Tenn. Coal, Iron & R.R. Co.	Fairfield, Ala.	GE
28	3000	325–485	600	d.c.	24" Structural Mill	Geared	1923	Phoenix Iron Co.	Phoenixville, Pa.	W
29	3000	360	6600	60 cy.	28" Rail Mill	Geared	1919	Dominion Iron & Steel Co.	Sydney, N. S.	GE
30	3000	500	6600	25 cy.	26" Rail Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
31	3000	500	6600	25 cy.	26" Rail Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
32	3200	50–120	700	d.c.	34" Rev. Struct. (Rough.)	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
33	3200	50–120	700	d.c.	28" Structural (Fin.) Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
34	3500	50–120	700	d.c.	35" Struct. Mill (Rough.)	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	W
35	3500	150–300	230	d.c.	18-14" Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	AC
36	4000	83	6600	60 cy.	33" Structural Mill	Direct	1920	Carnegie Steel Co.	Homestead, Pa.	GE
37	5000	50–120	700	d.c.	36" Struct. (Rough.) Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
38	5000	75–150	700	d.c.	28" Structural (Fin.) Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	W
39	5000	595	6600	60 cy.	28" 3 Stand Rail Mill	Coupled		Tenn. Coal, Iron & R.R. Co.	Birmingham, Ala.	AC
40	6000	75	6600	25 cy.	40" Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
41	6000	83	6600	25 cy.	28" Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
42	6000	83	6600	25 cy.	28" Rail Mill	Geared	1913	Minnesota Steel Co.	Duluth, Minn.	W
43	6000	88	6600	25 cy.	28" Rail Mill	Direct	1906	Illinois Steel Co.	Gary, Ind.	GE
44	6000	98	6600	25 cy.	28"-32" Structural Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
45	8000	150	600	d.c.	28" Rail Mill	Direct	1917	Bethlehem Steel Co.	Lackawanna, N. Y.	GE

BAR AND BILLET MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	250	440	25 cy.	Cogging Mill	Geared	1910	Simonds Mfg. Co.	Lockport, N. Y.	GE
2	300	375	2200	25 cy.	Bar Mill	Coupled		Bethlehem Steel Co.	Johnstown, Pa.	AC
3	300	375	2200	25 cy.	10" Bar Mill	Geared	1919	Hammond Steel Co.	Solvay, N. Y.	GE
4	300	400	550	40 cy.	10" Bar Mill	Geared	1909	Ludlum Steel Co.	Watervliet, N. Y.	GE
5	300	450	230	d.c.	Bar Mill	Geared	1916	Carbon Steel Co.	Pittsburgh, Pa.	W
6	300	450	550	60 cy.	Bar Mill	Coupled		Nat'l Conduit & Cable Co.	Hast. on Hudson, N.Y	AC
7	300	514	2200	60 cy.	Bar Mill	Geared		C. G. Hussey	Pittsburgh, Pa.	AC
8	300-300-150	600-400-300	440	60 cy.	Bar Mill	Chain	1916	Vulcan Crucible Steel Co.	Aliquippa, Pa.	GE
9	300	600	2300	60 cy.	12" Billet Mill	Geared	1916	Tenn. Coal, Iron & R. R. Co.	Bessemer, Ala.	GE
10	300	720	440	60 cy.	Bar Mill	Geared		Hoskins Mfg. Co.,	Detroit, Mich.	AC
11	300	750	2200	25 cy.	10" Bar Mill	Geared	1923	Bethlehem Steel Co.	Lebanon, Pa.	GE
12	335	360	2200	60 cy.	Bar Mill	Geared	1915	Heppenstall Forge & Knife Co.	Pittsburgh, Pa.	GE
13	350	125	6600	25 cy.	12" Bar Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
14	350-350	360-240	440	60 cy.	Bar Mill	Coupled		Simmons Mfg. Co.	Kenosha, Wis.	AC
15	350	600	2200	60 cy.	Bar Mill	Belted		Joslyn Mfg. Co.	Chicago, Ill.	AC
16	400-400	107-64	2200	25 cy.	16" Bar Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
17	400	400	400	60 cy.	Bar Mill	Chain		Latrobe Steel Co.	Latrobe, Pa.	AC
18	400	450	2200	60 cy.	12" Bar Mill	Geared	1924	Atchison, Topeka & Santa Fe Ry.		AC
19	400	450	2200	60 cy.	9" Bar Mill	Geared	1924	Atchison, Topeka & Santa Fe Ry.		AC
20	400	514	2200	60 cy.	Bar Mill	Geared		Judson Mfg. Co.	Oakland, Calif.	AC
21	400-225	600-300	550	40 cy.	Bar Mill	Geared	1909	Ludlum Steel Co.	Watervliet, N. Y.	GE
22	400	705	2200	60 cy.	16" Cogging Mill	Geared	1923	Crucible Steel Co. of America	Park Works, Pgh., Pa	W
23	400	720-450	2200	60 cy.	Bar Mill	Geared		Cyclops Steel Co.	Titusville, Pa.	AC
24	400-265	875-585	2200	60 cy.	Bar Mill	Geared	1913	Old Dominion Iron & Nail Co.	Richmond, Va.	W
25	450	125	6600	25 cy.	12" Bar Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
26	500	250	440	25 cy.	10" Bar Mill	Geared	1917	Simonds Mfg. Co.	Lockport, N. Y.	GE
27	500	300	2200	60 cy.	Bar Mill	Coupled		Ft. Wayne Rolling Mill Co.	Ft. Wayne, Ind.	AC
28	500	360	2200	60 cy.	16" Bar Mill	Geared	1915	Tenn. Coal, Iron & R. R. Co.	Bessemer, Ala.	GE
29	500	450	440	60 cy.	Bar Mill	Geared	1910	Chase Rolling Mills Co.	Waterbury, Conn.	GE
30	500	450	440	60 cy.	Bar Mill	Geared	1910	Chase Rolling Mills Co.	Waterbury, Conn.	GE
31	500	450	440	60 cy.	16" Bar Mill	Geared	1914	Carbon Steel Co.	Pittsburgh, Pa.	GE
32	500	450	2200	60 cy.	Billet Mill	Geared	1915	International High Speed Steel Co	Rockaway, N. J.	GE
33	500	500	2200	25 cy.	16" Bar Mill	Geared	1919	Hammond Steel Co.	Solvay, N. Y.	GE
34	500	514	2200	60 cy.	Bar Mill	Rope		Henry Disston & Son	Philadelphia, Pa.	AC
35	500	514	2200	60 cy.	Bar Mill	Geared		Metals Production Equip. Co	Springfield, Mass.	AC
36	500	514	2200	60 cy.	Bar Mill	Geared		Metals Production Equip. Co.	Springfield, Mass.	AC
37	500	514	2200	60 cy.	Bar Mill	Geared		Metals Production Equip. Co.	Springfield, Mass.	AC
38	500	514	440	60 cy.	Bar Mill	Chain		Simmons Mfg. Co.	Kenosha, Wis.	AC
39	500	514	2200	60 cy.	Bar Mill	Geared		Judson Mfg. Co.	Oakland, Calif.	AC
40	500	600	2200	60 cy.	Bar Mill	Belted		Joslyn Mfg. Co.	Chicago, Ill.	AC
41	600	171	440	40 cy.	Bar Mill	Geared	1910	Ludlum Steel Co.	Watervliet, N. Y.	GE
42	600	300	2200	25 cy.	Muck Mill	Chain		St. Louis Screw Co.	St. Louis, Mo.	AC
43	600-600	300-214	2200	25 cy.	Bar Mill	Coupled & Rope		St. Louis Screw Co.	St. Louis, Mo.	AC
44	600	300-214	2200	25 cy.	Bar Mill	Chain		St. Louis Screw Co.	St. Louis, Mo.	AC
45	600	300-330		d.c.	10" Bar Mill	Coupled	1921	Universal Steel Company	Bridgeville, Pa.	CW
46	600	368	6600	25 cy.	18-21" Bar (Rough.) Mill	Geared	1924	Pittsburgh Crucible Steel Co.	Midland, Pa.	GE
47	600	490	2200	25 cy.	16" Bar (Roughing) Mill	Geared	1919	Scullin Steel Co.	St. Louis, Mo.	W
48	700	250	2200	25 cy.	18" Bar Mill	Rope	1911	Dilworth Porter Co.	Pittsburgh, Pa.	GE
49	700	390	2200	60 cy.	18" Bar Mill	Geared	1922	Dilworth Porter Co.	Pittsburgh, Pa.	W
50	700	600		60	14" Bar Mill	Coupled	1921	Universald Steel Company	Bridgeville, Pa.	CW
51	750	120-210	250	d.c.	14" Bar Mill	Coupled	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
52	750	120-210	250	d.c.	14" Bar Mill	Coupled	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
53	750-750	225-168	440	60 cy.	Bar Mill	Coupled		Simmons Mfg. Co.	Kenosha, Wis.	AC
54	750	250	2200	25 cy.	Bar Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
55	750	250	440	25 cy.	Bar Mill	Coupled		Simonds Mfg. Co.	Lockport, N. Y.	AC
56	800	220-150	2200	25 cy.	12" Bar (Finishing) Mill	Direct	1919	Scullin Steel Co.	St. Louis, Mo.	W
57	800	250	2200	60 cy.	22" Bar Mill	Rope	1915	Timken Roller Bearing Co.	Canton, Ohio	W
58	800	257	2200	60 cy.	Bar Mill	Geared	1914	Standard Seamless Tube Co.	Economy, Pa.	GE
59	800	277	2200	60 cy.	Bar Mill	Geared		Pacific Coast Steel Co.	San Francisco, Calif.	AC
60	800	292	2200	25 cy.	18" Tandem Billet Mill	Direct	1912	Laclede Steel Co.	Alton, Ill.	W
61	800	350	2200	60 cy.	Billet Mill	Geared	1915	Milton Manufacturing Co.	Milton, Pa.	W
62	800	514	2200	60 cy.	Bar Mill	Geared		Judson Mfg. Co.	Oakland, Calif.	AC
63	800-400	600-300	550	40 cy.	Bar Mill	Geared	1916	Ludlum Steel Co.	Watervliet, N. Y.	GE
64	800-400	600-300	550	40 cy.	Bar Mill	Geared	1917	Ludlum Steel Co.	Watervliet, N. Y.	GE
65	800	730-365	2200	50 cy.	22" Bar Mill	Geared	1916	Columbia Steel Co.	Los Angeles, Cal.	W
66	800	880-490	2200	60 cy.	16" Bar Mill	Geared	1920	Knoxville Iron Co.	Knoxville, Tenn.	W
67	850	505	2200	60 cy.	24" Bar (Roughing) Mill	Geared	1919	Central Steel Co.	Massillon, Ohio	W
68	1000	277	2200	60 cy.	22" Bar Mill	Geared	1919	Pennsylvania Forge Co.	Philadelphia, Pa.	GE
69	1000	375	2200	25 cy.	Bar Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
70	1000	450	2200	60 cy.	Bar Mill	Rope		Pacific Coast Steel Co.	Seattle, Wash.	AC
71	1200-1000-800	450-275-300	6600	25 cy.	18" Bar Mill, No. 16	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
72	1200	505	2200	60 cy.	Bar (Roughing) Mill	Geared	1922	Youngstown Steel Co.	Youngstown, Ohio	W
73	1200	514	2200	60 cy.	Bar Mill	Geared		Elyria Iron & Steel Co.	Elyria, Ohio	AC
74	1250	375	2080	25 cy.	18" Billet Mill	Geared	1918	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
75	1250	375	2080	25 cy.	18" Billet Mill	Geared	1918	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
76	1400	505	2200	60 cy.	14" Billet Mill	Geared	1917	Wickwire Spencer Steel Corp.	Palmer, Mass.	W
77	1500	182-162	6600	25 cy.	10" Bar Mill	Direct	1913	Carnegie Steel Co.	Duquesne, Pa.	W
78	1500	266	6400	25 cy.	Billet Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
79	1500	270	2200	60 cy.	22" Bar and Billet Mill	Geared	1918	Central Steel Co.	Massillon, Ohio	W
80	1500	440	2200	60 cy.	22" Bar Mill	Geared	1919	Kansas Bolt & Nut Co.	Kansas City, Mo.	W
81	1500	450	2200	60 cy.	Bar Mill	Rope		Pacific Coast Steel Co.	Seattle, Wash.	AC
82	1500	450	2200	60 cy.	Roughing Mill	Geared		Pacific Coast Steel Co.	San Francisco, Calif.	AC
83	1500	705	2200	60 cy.	24" Bar (Finishing) Mill	Geared	1922	Youngstown Steel Co.	Youngstown, Ohio	W
84	1500	705	2200	60 cy.	22" Bar Mill	Geared	1924	Atchison, Topeka & Santa Fe Ry.		AC
85	1500	735	2200	25 cy.	Bar Mill	Geared	1923	Scullin Steel Co.	St. Louis, Mo.	AC
86	1600	150	6600	25 cy.	Bar Mill	Direct	1912	Pittsburgh Crucible Steel Co.	Pittsburgh, Pa.	GE
87	1600	257	2200	60 cy.	14" Cont. Billet Mill	Geared	1912	Atlantic Steel Co.	Atlanta, Ga.	GE
88	1600	280	2200	60 cy.	Continuous Billet Mill	Geared	1913	Steel Company of Canada	Hamilton, Ont.	W
88	1650-1500-1350	413-375-337	6600	25 cy.	10" Bar Mill, No. 10	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
89	1750	70-120	600	d.c.	29" Reversing Billet Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
90	1800	75	6600	25 cy.	30" Billet Mill	Direct	1914	Bethlehem Steel Co.	Bethlehem, Pa.	GE
91	1800	75	6600	25 cy.	30" Billet Mill	Direct	1914	Bethlehem Steel Co.	Bethlehem, Pa.	GE
92	1800	366	2200	25 cy.	22" Billet and Struct. Mill	Geared	1919	Scullin Steel Co.	St. Louis, Mo.	W
93	1800-1800-1800	370-300-247	6600	60 cy.	Sheet Bar Mill	Geared	1920	American Rolling Mill Co.	Ashland, Ky.	GE
94	1850-1450- 925	120- 94- 60	6600	25 cy.	16" Hand Bar Mill	Direct	1921	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
95	2000	50-100	600	d.c.	30" Reversing Bar Mill	Direct	1919	Follansbee Brothers Co.	Toronto, Ohio	W
96	2000	214	6600	25 cy.	40" Billet Mill	Geared	1907	Illinois Steel Co.	Gary, Ind.	GE
97	2000	214	6600	25 cy.	40" Billet Mill	Geared	1907	Illinois Steel Co.	Gary, Ind.	GE
98	2000	240	2200	60 cy.	18" Sheet Bar Mill	Geared	1920	Nat. Enameling & Stamping Co.	Granite City, Ill.	GE
99	2200-2000-1800	275-250-225	6600	25 cy.	10" Bar Mill, No. 15	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
100	2200	505-303	2200	60 cy.	18" Bar (Finishing) Mill	Geared	1919	Central Steel Co.	Massillon, Ohio	W
101	2500	150	6600	25 cy.	28" Billet Mill	Geared	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	GE
102	2500	240	2200	60 cy.	24" Sheet Bar Mill	Geared	1920	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	GE
103	2500	500	2200	60 cy.	22" Bar Mill	Geared	1923	Phoenix Iron Co.	Phoenixville, Pa	W
104	2750-2500-2250	275-250-225	6600	25 cy.	14" Bar Mill, No. 14	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
105	3000	250	6600	25 cy.	18" Cont. Billet Mill	Geared	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
106	3000	375	2200	25 cy.	18" Billet Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE

BAR AND BILLET MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Current	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
107	3000	375	6600	25 cy.	24″ Sheet Bar Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
108	3250	94	6600	25 cy.	18″ Sheet Bar Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
109	3500	92	2200	60 cy.	18″ Sheet Bar Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
110	3500	92	2200	60 cy.	21″ Sheet Bar Mill	Direct	1918	Trumbull Steel Co.	Warren, Ohio	GE
111	4000	83	6600	25 cy.	24″ Cont. Billet Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
112	4000	93	6600	60 cy.	18″ Continuous Bar Mill	Direct	1919	Weirton Steel Co.	Weirton, W. Va.	W
113	4000	93	6600	60 cy.	21″ Continuous Bar Mill	Direct	1919	Weirton Steel Co.	Weirton, W. Va.	W
114	4000	360	2200	60 cy.	21″ Sheet Bar Mill	Geared	1917	Sharon Steel Hoop Co.	Lowellville, Ohio	GE
115	4200	93	2200	60 cy.	Continuous Bar Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
116	5000	450	2300	60 cy.	18″ Cont. Sheet Bar & Billet Mill	Geared	1919	Wheeling Steel Corp.	Portsmouth, Ohio	GE
117	5000	594	6600	60 cy.	Sheet and Billet Mill	Geared	1924	Tenn. Coal, Iron & R. R. Co.	Birmingham, Ala.	GE
118	5750	94	6600	25 cy.	21″ Cont. Billet Mill	Direct	1914	McKinney Steel Co.	Cleveland, Ohio	GE
119	5750	94	6600	25 cy.	18″ Bar Mill	Direct	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
120	5750	94	6600	25 cy.	21″ Bar Mill	Direct	1921	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
121	5750	94	6600	25 cy.	18″ Billet Mill	Geared	1923	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
122	5750	94	6600	25 cy.	21″ Billet Mill	Geared	1923	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
123	6000	83	6600	25 cy.	32″ Billet Mill	Direct	1907	Illinois Steel Co.	Gary, Ind.	GE
124	6000	83	6600	25 cy.	24″ Billet Mill	Direct	1907	Illinois Steel Co.	Gary, Ind.	GE
125	6000	83	6600	25 cy.	18″ Billet Mill	Direct	1907	Illinois Steel Co.	Gary, Ind.	GE
126	6000	83	6600	25 cy.	18″ Sheet Bar Mill	Direct	1910	Illinois Steel Co.	Gary, Ind.	GE
127	6250	368	2200	25 cy.	24″ Cont. Billet Mill	Geared	1922	Inland Steel Co.	Indiana Harbor, Ind.	W

SHEET BAR AND SKELP MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Current	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	350	500	230	d.c.	16″ Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
2	550	575	2200	60 cy.	16″ Skelp Mill	Geared	1919	Tyler Tube & Pipe Co.	Washington, Pa.	W
3	800	350	2200	60 cy.	24″ Sheet Bar (B.H.) Mill	Geared	1915	Central Steel Co.	Massillon, Ohio	W
4	1000	125	230	d.c.	Sheet Bar Mill	Geared	1920	Allegheny Steel Co.	Brackenridge, Pa.	GE
5	1000	209	6600	25 cy.	14″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
6	1000	293	6600	25 cy.	14″ Cont. Skelp Mi..	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
7	1000	600	2200	60 cy.	16″ Skelp Mill	Geared	1923	Elyria Iron & Steel Co.	Elyria, Ohio	GE
8	1250	294	6600	25 cy.	14″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
9	1500	234	2200	60 cy.	26″ Sheet Bar Mill	Geared	1916	Canton Sheet Steel Co.	Canton, Ohio	W
10	1500	270	2200	60 cy.	24″ Sheet Bar Mill	Geared	1914	Central Steel Co.	Massillon, Ohio	W
11	1500	270	2200	60 cy.	22″ Sheet Bar, Billet Mill	Geared	1918	Central Steel Co.	Massillon, Ohio	W
12	1500	277	2200	d.c.	22″ Skelp Mill	Direct	1924	Bethlehem Steel Corp.	Coatesville, Pa.	GE
13	1500	368	2200	25 cy.	Sheet Bar (Fin.) Mill	Geared	1923	Inland Steel Co.	Chicago, Ill.	W
14	1500	450	2200	30 cy.	3 High Skelp Mill	Geared	1915	Spang Chalfant Co.	Etna, Pa.	GE
15	1500	491	6600	25 cy.	14″ Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
16	2000	50–100	600	d.c.	30″ Rev. Sheet Bar Mill	Direct	1919	Follansbee Brothers Co.	Toronto, Ohio	W
17	2000	234–161	2200	60 cy.	10″ Skelp (Fin.) Mill	Belted	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
18	2000–2000	250–161	6600	25 cy.	10″ Skelp Mill	Geared	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
19	2000	294	6600	25 cy.	14″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
20	2000	350–234	2200	60 cy.	10″ Skelp (Rough.) Mill	Geared	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
21	2300–1300	115.4–65	6600	25 cy.	10″ Skelp Mill	Geared	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
22	2500	146	6600	25 cy.	16″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
23	2500	184	6600	25 cy.	Skelp Mill	Rope	1908	National Tube Co.	Lorain, Ohio	W
24	2500	184	6600	25 cy.	Skelp Mill	Rope	1908	National Tube Co.	Lorain, Ohio	W
25	2500	252	2200	60 cy.	Skelp Mill	Geared		Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
26	2500	252	2200	60 cy.	Skelp Mill	Geared		Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
27	2500	295	6600	25 cy.	16″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
28	3000	184	6600	25 cy.	16″ Cont. Skelp Mill	Coupled	1924	Gary Tube Co.	Gary, Ind.	AC
29	3000	354–212	2200	60 cy.	Skelp Mill	Geared	1920	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
30	4000	80	650	d.c.	30″ Universal Skelp Mill	Direct	1922	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
31	5500	370	6600	25 cy.	16″ Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC

SHEET AND TIN PLATE DRIVES

No.	Horse Power	R.P.M.	Voltage	Current	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	250	440	25 cy.	Sheet Mill	Geared	1910	Simonds Mfg. Co.	Lockport, N. Y.	GE
2	350	320	2200	60 cy.	Sheet Mill	Geared	1917	Universal Steel Co.	Bridgeville, Pa.	W
3	350	400–600		d.c.	Hot Mill	Geared	1913	Bethlehem Steel Corp.	Lackawanna, N. Y.	CW
4	350	400–600		d.c.	Hot Mill	Geared	1913	Bethlehem Steel Corp.	Lackawanna, N. Y.	CW
5	500	300	2200	60 cy.	Sheet Mill			U. S. Aluminum Co.	New Kensington, Pa.	AC
6	500	300	2200	60 cy.	Sheet Mill			U. S. A uminum Co.	New Kensington, Pa.	AC
7	500	300	2200	60 cy.	Sheet Mill			U. S. Aluminum Co.	New Kensington, Pa.	AC
8	500	450	2200	60 cy.	Sheet Mill	Geared	1915	American Brass Co.	Torrington, Conn.	GE
9	600	300	2200	60 cy.	Sheet Mill	Geared		Universal Rolling Mill Co.	Bridgeville, Pa.	AC
10	700	320	2200	60 cy.	Sheet and Jobbing Mill	Direct	1917	Carbon Steel Co.	Pittsburgh, Pa.	W
11	750	94	2200	25 cy.	Sheet Mill	Rope	1912	West Penn Steel Co.	Brackenridge, Pa.	GE
12	750	250	2200	60 cy.	Tin Mill	Geared	1914	Weirton Steel Co.	Weirton, W. Va.	W
13	800	214	2200	25 cy.	Sheet Mill	Geared	1919	Am. Sheet & Tin Plate Co.	Gary, Ind.	GE
14	800	214	2200	25 cy.	Sheet Mill	Geared	1919	Am. Sheet & Tin Plate Co.	Gary, Ind.	GE
15	900	94	2200	25 cy.	Jobbing Sheet Mill	Rope	1910	Am. Sheet & Tin Plate Co.	Gary, Ind.	GE
16	900	94	2200	25 cy.	Jobbing Sheet Mill	Rope	1910	Am. Sheet & Tin Plate Co.	Gary, Ind.	GE
17	1000	83	2200	25 cy.	Sheet Mill	Rope	1910	Follansbee Bros.	Follansbee, W. Va.	GE
18	1000	240	440	60 cy.	Sheet Mill			Hudson Sh. & T. P. Co.	Monetta, Ohio	AC
19	1000	245	2200	25 cy.	30″ Sheet Mill	Rope	1910	American Rolling Mill Co.	Middletown, Ohio	W
20	1000	250	6600	25 cy.	Sheet Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
21	1000	250	6600	25 cy.	Sheet Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
22	1000	250	6000	25 cy.	Tin Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
23	1000	250	6600	25 cy.	Tin Mill	Geared	1919	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
24	1000	250	2200	25 cy.	Sheet Mill			Otis Steel Co.,	Cleveland, Ohio	AC
25	1000	250	2200	25 cy.	Sheet Mill			Otis Steel Co.	Cleveland, Ohio	AC
26	1000	252	2200	60 cy.	Sheet Mill	Geared	1920	American Rolling Mill Co.	Zanesville, Ohio	W
27	1000	300	2200	60 cy.	Sheet Mill	Geared	1919	Superior Sheet Steel Co.	Canton, Ohio	GE
28	1000	300	2200	60 cy.	Sheet Mill	Geared	1919	Superior Sheet Steel Co.	Canton, Ohio	GE
29	1000	300	2200	60 cy.	Sheet Mill	Geared	1920	Milwaukee Rolling Mills Co.	Milwaukee, Wis.	GE

SHEET AND TIN PLATE DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
30	1000	300	2200	60 cy.	Sheet Mill	Geared	1920	Milwaukee Rolling Mills Co.	Milwaukee, Wis.	GE
31	1150	250	6600	25 cy.	Jobbing Sheet Mill	Geared	1913	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
32	1200	214	2200	25 cy.	Jobbing Sheet Mill	Geared	1913	Otis Steel Co.	Cleveland, Ohio	GE
33	1200	240	2200	60 cy.	Sheet Mill	Geared	1915	Empire Rolling Mills	Cleveland, Ohio	GE
34	1200	240	2200	60 cy.	Sheet Mill	Geared	1916	Mahoning Valley Steel Co.	Niles, Ohio	GE
35	1200	240	2200	60 cy.	Sheet Mill	Geared	1916	United Alloy Steel Corp.	Canton, Ohio	GE
36	1200	240	2200	60 cy.	Sheet Mill	Geared	1917	United Alloy Steel Corp.	Canton, Ohio	GE
37	1200	240	2200	60 cy.	Sheet Mill	Geared	1920	Republic Iron & Steel Co.	Youngstown, Ohio	GE
38	1200	240	2200	60 cy.	Sheet Mill	Geared	1920	Republic Iron & Steel Co.	Youngstown, Ohio	GE
39	1200	240	440	25 cy.	26″ Sheet Mill	Rope	1907	Seneca Iron & Steel Co.	Buffalo, N. Y.	W
40	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Company	Canonsburg, Pa.	CW
41	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Company	Canonsburg, Pa.	CW
42	1200	240		60	Hot Sheet Mill	Coupled	1915	Standard Tin Plate Company	Canonsburg, Pa.	CW
43	1200	240		60	Hot Sheet Mill	Coupled	1916	Standard Tin Plate Company	Canonsburg, Pa.	CW
44	1200	240		60	Hot Sheet Mill	Coupled	1916	Standard Tin Plate Company	Canonsburg, Pa.	CW
45	1200	244	2200	25 cy.	Sheet Mill	Geared	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	W
46	1200	244	2200	25 cy.	Sheet Mill	Geared	1916	Bethlehem Steel Co.	Sparrows Pt., Md.	W
47	1200	244	2200	25 cy.	Sheet Mill	Geared	1920	American Rolling Mill Co.	Middletown, Ohio	W
48	1200	244	2200	25 cy.	Sheet Mill	Geared	1920	American Rolling Mill Co.	Middletown, Ohio	W
49	1200	295	6600	60 cy.	Sheet Mill	Coupled		Weirton Steel Co.	Weirton, W. Va.	AC
50	1200	295	6600	60 cy.	Sheet Mill	Coupled		Weirton Steel Co.	Weirton, W. Va.	AC
51	1200	300	4100	60 cy.	Sheet Mill	Geared	1920	Chapman Price Steel Co.	Indianapolis, Ind.	GE
52	1200	300	2200	60 cy.	Sheet Mill	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
53	1200	300	2200	60 cy.	Sheet Mill	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
54	1200	300	2200	60 cy.	Sheet Mill	Geared	1924	Thomas Sheet Steel Co.	Niles, Ohio	GE
55	1200	300	2200	60 cy.	Sheet Mill	Geared	1924	Thomas Sheet Steel Co.	Niles, Ohio	GE
56	1200	352	2200	60 cy.	Sheet Mill	Rope	1917	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
57	1250	250	6600	25 cy.	Hot Tin Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
58	1250	250	6600	25 cy.	Hot Tin Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
59	1250	250	6600	25 cy.	Cold Tin Mill	Geared	1924	Bethlehem Steel Co.	Sparrows Pt., Md.	GE
60	1400	240	2200	60 cy.	Sheet Mill	Geared	1912	Apollo Steel Co.	Apollo, Pa.	GE
61	1500	187	2200	25 cy.	Sheet Mill	Chain		National Enamel & Stamp. Co.	Granite City, Ill.	AC
62	1500	210	2200	25 cy.	30″ Sheet Mill	Rope	1910	American Rolling Mill Co.	Middletown, Ohio	W
63	1500	234	2200	60 cy.	Sheet Mill	Geared	1915	Canton Sheet Steel Co.	Canton, Ohio	W
64	1500	234	2200	60 cy.	Sheet Mill	Geared	1916	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
65	1500	234	2200	60 cy.	Sheet Mill	Geared	1917	Liberty Steel Co.	Warren, Ohio	W
66	1500	234	2200	60 cy.	Sheet Mill	Geared	1919	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
67	1500	240	2200	60 cy.	Sheet Mill	Geared	1922	United Alloy Steel Corp.	Canton, Ohio	GE
68	1500	240	2200	60 cy.	Sheet Mill	Geared		Follensbee Bros.	Toronto, Ohio	AC
69	1500	240	2200	60 cy.	Sheet Mill	Geared		Follensbee Bros.	Toronto, Ohio	AC
70	1500	240	2200	60 cy.	Sheet Mill			Canton Sheet Steel Co.	Canton, Ohio	AC
71	1500	250	2200	25 cy.	Sheet Mill	Geared	1919	Eastern Rolling Mills Co.	Baltimore, Md.	GE
72	1500	250	2200	25 cy.	Sheet Mill	Geared	1919	Eastern Rolling Mills Co.	Baltimore, Md.	GE
73	1500	270	2200	60 cy.	Sheet Mill	Geared	1914	Youngstown Sheet & Tube Co.	Warren, Ohio	W
74	1500	295	2200	60 cy.	Sheet Mill	Geared	1924	Kansas City Bolt & Nut Co.	Kansas City, Mo.	AC
75	1500	300	4600	25 cy.	Sheet Mill	Geared	1922	Michigan Steel Corp	Detroit, Mich.	GE
76	1500	300	4600	25 cy.	Sheet Mill	Geared	1924	Michigan Steel Corp.	Detroit, Mich.	GE
77	1500	360	4000	60 cy.	Sheet Mill	Geared	1923	Metal & Thermit Corp.	So.San Francisco,Cal	GE
78	1500	360	2200	60 cy.	Sheet Mill	Geared	1923	Columbia Steel Co.	Pittsburgh, Cal.	GE
79	1600	94	2200	25 cy.	Sheet Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
80	1600	94	2200	25 cy.	Sheet Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
81	1600	94	2200	25 cy.	Sheet Mill	Rope	1913	American Sheet & Tin Plate Co.	Gary, Ind.	GE
82	1600	94	2200	25 cy.	Sheet Mill	Rope	1913	American Sheet & Tin Plate Co.	Gary, Ind.	GE
83	1600	94	2200	25 cy.	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
84	1600	94	2200	25 cy.	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
85	1600	94	2200	25 cy.	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
86	1600	94	2200	25 cy.	Tin Mill	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
87	1600	210	2200	25 cy.	Sheet Mill	Geared	1912	Inland Steel Co.	Indiana Harbor, Ind.	W
88	1600	240	2200	60 cy.	Sheet Mill	Geared	1919	Falcon Steel Co.	Niles, Ohio	GE
89	1600	250	440	25 cy.	Sheet Mill	Geared	1914	Seneca Iron & Steel Co.	Buffalo, N. Y.	GE
90	1600	270	2200	60 cy.	Sheet Mill	Geared	1916	Wheeling Steel Corporation	Wheeling, W Va.	W
91	1600	270	2200	60 cy.	Sheet Mill	Geared	1916	Wheeling Steel Corporation	Portsmouth, Ohio	W
92	1700	214	2200	25 cy.	Sheet Mill	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
93	1700	214	2200	25 cy.	Tin Mill	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
94	1700	214	2200	25 cy.	Tin Mill	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
95	1700	214	2200	25 cy.	Tin Mill	Geared	1918	American Sheet & Tin Plate Co.	Gary, Ind.	GE
96	1700	214	2200	25 cy.	Tin Mill	Geared	1918	American Sheet & Tin Plate Co.	Gary, Ind.	GE
97	1700	214	2200	25 cy.	Tin Mill	Geared	1918	American Sheet & Tin Plate Co.	Gary, Ind.	GE
98	1700	214	2200	25 cy.	Tin Mill	Geared	1919	American Sheet & Tin Plate Co.	Gary, Ind.	GE
99	1800	235	2200	60 cy.	Sheet Mill	Geared	1915	Trumbull Steel Co.	Warren, Ohio	W
100	1800	240	2200	60 cy.	Sheet Mill	Geared	1920	Apollo Steel Co.	Apollo, Pa.	GE
101	1800	270	2200	60 cy.	Sheet Mill	Geared	1916	Andrews Steel Co.	Newport, Ky.	W
102	1800	270	2200	60 cy.	Sheet Mill	Geared	1916	Andrews Steel Co.	Newport, Ky.	W
103	2000	234	2200	60 cy.	Sheet Mill	Geared	1919	Newton Steel Co.	Newton Falls, Ohio	W
104	2000	235	2200	60 cy.	Tin Mill	Geared	1920	Nat. Enameling & Stamping Co.	St. Louis, Mo.	W
105	2000	234	2200	60 cy.	Sheet Mill	Geared	1921	Newton Steel Co.	Newton Falls, Ohio	W
106	2000	234	2200	60 cy.	Sheet Mill	Geared	1923	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
107	2000	240	2200	60 cy.	Sheet Mill	Geared	1919	Republic Iron & Steel Co.	Niles, Ohio	GE
108	2000	250	6600	25 cy.	Sheet Mill	Geared	1920	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
109	2000	250	6600	25 cy.	Sheet Mill	Geared	1920	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
110	2000	600	6600	60 cy.	Sheet Mill	Geared	1924	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE

ROD MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	575	2200	60 cy.	Rod Mill	Geared	1923	Standard Underground Cable Co.	Perth Amboy, N. J.	W
2	300	720	2200	60 cy.	Wire Rod Mill.	Geared		Rome Wire Co.	Rome, N. Y.	AC
3	350	250	2200	25 cy.	10″ Rod Mill	Direct	1911	Dillworth Porter Co.	Pittsburgh, Pa.	GE
4	360	300-425	230	d.c.	8″ Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
5	360	300-600	230	d.c.	Rod Mill	Direct	1922	United Alloy Steel Corporation	Canton, Ohio	W
6	360	350-500	230	d.c.	7″ Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
7	450	400-650	230	d.c.	Rod Mill	Direct	1913	American Steel & Wire Co.	Worcester, Mass.	W
8	600	440	2200	60 cy.	10″ Rod Mill	Direct	1917	Wickwire Spencer Steel Corp.	Palmer, Mass.	W
9	600-400	514-300	2200	60 cy.	Rod Mill	Direct	1912	Oliver Iron & Steel Co.	Pittsburgh, Pa.	GE
10	800	257	2200	60 cy.	12″ Rod Mill	Belt	1915	Crucible Steel Co. of America	Harrison, N. J.	GE
11	800-363	706-320	600	d.c.	10″ Rod Mill	Geared	1922	Wheeling Steel Corporation	Portsmouth, Ohio	GE
12	800-363	706-320	600	d.c.	10″ Rod Mill	Geared	1922	Wheeling Steel Corporation	Portsmouth, Ohio	GE
13	800-363	706-320	600	d.c.	10″ Rod Mill	Geared	1922	Wheeling Steel Corporation	Portsmouth, Ohio	GE
14	975-325	650-250	600	d.c.	Rod (Roughing) Mill	Geared	1922	Atlantic Steel Co.	Altanta, Ga.	W
15	975-510	865-450	600	d.c.	Rod (Finishing) Mill	Direct & Belted	1922	Atlantic Steel Co.	Atlanta, Ga.	W
16	1180-955-705	560-450-336	2200	60 cy.	Rod Mill	Belt	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
17	1200	360	2200	60 cy.	Morgan Wr. Rod Mill	Geared		Interstate Iron & Steel Co.	Chicago, Ill.	AC
18	1250	175-400	230	d.c.	Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
19	1250-1000-650	650-500-325	2200	25 cy.	Rod Mill	Belt	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
20	1300	500	6400	25 cy.	Rod (Finishing) Mill	Rope	1910	American Steel & Wire Co.	Birmingham, Ala.	W
21	1500	150	6600	25 cy.	Wire Rod Mill	Coupled		Illinois Steel Co.	Joliet, Ill.	AC
22	1500	234	2200	60 cy.	10″ Rod Mill	Geared	1921	Columbia Steel Co.	Pittsburgh, Cal.	W
23	1500	270	2200	60 cy.	Lamberton Rod Mill	Geared	1915	United Alloy Steel Corporation	Canton, Ohio	W
24	1500	470-510	230	d.c.	Rod Mill	Direct	1923	John A. Roebling Sons	New York, N. Y.	W
25	1600	210-420	525	d.c.	Rod Mill	Geared	1913	Steel Company of Canada	Hamilton, Ont.	W
26	1600	210-420	525	d.c.	Rod Mill	Geared	1913	Steel Company of Canada	Hamilton, Ont.	W
27	1600	500	6600	25 cy.	Rod (Finishing) Mill	Rope	1910	American Steel & Wire Co.	Birmingham, Ala.	W
28	1800	514	2200	60 cy.	Rod Mill	Geared	1923	Columbia Steel Co.	Pittsburgh, Cal.	GE
29	1850	575-221	600	d.c.	Rod Mill	Direct & Belted	1922	Atlantic Steel Co.	Atlanta, Ga.	W
30	2360-1880-1440	410-327-250	2200	60 cy.	Rod Mill	Geared	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
31	2400	500	6600	25 cy.	Wire Rod Mill	Geared		Illinois Steel Co.	Gary, Ind.	AC
32	2470-1725-1235	430-300-215	2200	25 cy.	Rod Mill	Geared	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
33	2600	81 5	6600	25 cy.	Rod (Roughing) Mill	Geared	1910	American Steel & Wire Co.	Birmingham, Ala.	W
34	2600	368	6400	25 cy.	Rod Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
35	2870-1435	400-200	600	d.c.	10″ Rod Mill	Geared	1922	Wheeling Steel Corporation	Portsmouth, Ohio	GE
36	3000	150	6600	25 cy.	Wire Rod Mill	Coupled		Minnesota Steel Co.	Steelton, Minn.	AC

PIERCING MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	300		60	Piercing Mill	Coupled	1917	Pittsburgh Steel Products Co.	Monessen, Pa.	CW
2	300	300		60	Piercing Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
3	400	600	440	60 cy.	Billet Piercing Machine	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
4	400	600	400	60 cy.	Piercing Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
5	450	720	2200	60 cy.	Piercing Mill	Geared	1924	Standard Seamless Tube Co.	Economy, Pa.	GE
6	500	360	2200	60 cy.	Billet Piercing Mill	Geared	1922	Weldless Tube Co.	Wooster, Ohio	GE
7	500	500		25	Continuous Tube Mill	Coupled	1915	Pittsburgh Steel Products Co.	Monessen, Pa.	CW
8	600	485	550	25 cy.	Piercing Mill	Geared	1915	Baltimore Tube Co.	Baltimore, Md.	W
9	700	150	2200	60 cy.	Piercing Mill	Rope	1916	Ohio Seamless Tube Co.	Shelby, Ohio	GE
10	750-750	235-325	230	d.c.	Piercing Mill	Geared	1914	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	GE
11	750	353	2200	60 cy.	Piercing Mill	Direct	1915	National Tube Co.	Elwood City, Pa.	W
12	750	353	2200	60 cy.	Piercing Mill	Direct	1915	National Tube Co.	Elwood City, Pa.	W
13	750	353	2200	60 cy.	Piercing Mill	Direct	1915	National Tube Co.	Elwood City, Pa.	W
14	800	200-300	500	d.c.	Piercing Mill	Rope	1912	Pittsburgh Steel Products Co.	Monessen, Pa.	W
15	800	200-300	500	d.c.	Piercing Mill	Direct	1913	Pittsburgh Steel Products Co.	Monessen, Pa.	W
16	800	250	2200	60 cy.	Piercing Mill	Geared	1915	Timken Roller Bearing Co.	Canton, Ohio	W
17	1000	450	2200	60 cy.	Piercing Mill	Geared		Winchester Rep. Arms Co.	Bridgeport, Conn.	AC
18	1200	200	2200	60 cy.	Piercing Mill	Rope	1919	Ohio Seamless Tube Co.	Shelby, Ohio	GE
19	1600	600	2200	60 cy.	Piercing Mill	Geared	1921	Standard Seamless Tube Co.	Pittsburgh, Pa.	GE
20	2500	247	6600	25 cy.	Piercing Mill	Geared	1923	Gary Tube Company	Gary, Ind.	W

TUBE ROLLING MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	345-500	500	d.c.	Tube Rolling Mill	Geared	1912	Pittsburgh Steel Products Co.	Monessen, Pa.	W
2	300	350	2200	60 cy.	Seamless Tube Co.	Geared	1915	Timken Roller Bearing Co.	Canton, Ohio	W
3	300	350	2200	60 cy.	Tube Rolling Mill	Geared	1919	Timken Roller Bearing Co.	Canton, Ohio	W
4	300	350-450	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
5	300	435		d.c.	12″ Pipe Mill	Coupled	1910	A. M. Byers Company	Pittsburgh, Pa.	CW
6	300	435		d c.	12″ Pipe Mill	Coupled	1910	A. M. Byers Company	Pittsburgh, Pa.	CW
7	300	450	220	30 cy.	Lap Welding Rolls	Geared	1923	Spang Chalfant Co.	Etna, Pa.	GE
8	300	450	2200	60 cy.	Cross Rolls in Tube Mill	Geared	1924	Standard Seamless Tube Co.	Economy, Pa.	GE
9	300	450	2200	60 cy.	Cross Rolls in Tube Mill	Geared	1924	Standard Tube Co. Seamless	Economy, Pa.	GE
10	300	500	550	25 cy.	Tube Rolling Mill	Geared	1917	Baltimore Tube Co.	Baltimore, Md.	W
11	300	500	550	25 cy.	Tube Rolling Mill	Geared	1917	Baltimore Tube Co.	Baltimore, Md.	W
12	300	514	220	60 cy.	Tube Mill	Geared	1914	Detroit Seamless Tube Co.	Detroit, Mich.	GE
13	300	514	440	60 cy.	Tube Mill	Geared	1914	Detroit Seamless Tobe Co.	Detroit, Mich.	GE
14	300	514	220	60 cy.	Tube Mill	Geared		Detroit Seamless Tube Co.	Detroit, Mich.	AC
15	300	600	2200	60 cy.	Tube Mill	Geared	1922	Weldless Tube Co.	Wooster, Ohio	GE
16	300	600	2200	60 cy.	Tube Mill	Geared	1922	Weldless Tube Co.	Wooster, Ohio	GE
17	340	85		d.c.	Welding Rolls	Coupled	1906	National Tube Company	McKeesport, Pa.	CW
18	350-350	360-450	230	d.c.	Welding Rolls	Direct	1920	National Tube Co.	Lorain, Ohio	GE
19	350-350	360-450	230	d.c.	Welding Rolls	Direct	1920	National Tube Co.	Lorain, Ohio	GE
20	350	435	2200	60 cy.	Pipe Welding Roll Mill	Geared	1919	Wheeling Steel Corporation	Steubenville, Ohio	W
21	400	75		d.c.	Welding Rolls	Coupled	1906	National Tube Company	McKeesport, Pa.	CW
22	400	375	220	25 cy.	Tube Mill—Chill Rolls	Geared	1909	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
23	400	375	220	25 cy.	20″ Tube Mill—Wld.Rolls	Geared	1909	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
24	400	375	220	25 cy.	Tube Mill—Wld. Rolls	Geared	1917	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
25	400	375	220	25 cy.	Tube Mill—Wld. Rolls	Geared	1922	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE

TUBE ROLLING MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
26	400	375	220	25 cy.	Tube Mill—Wld. Rolls	Geared	1922	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
27	400	400	440	60 cy.	Lap Welding Rolls	Geared	1923	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	GE
28	400	400	440	60 cy.	Lap Welding Rolls	Geared	1923	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	GE
29	400	435	400	60 cy.	Pipe Mill	Geared	1918	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
30	400	600	440	60 cy.	Tube Mill	Geared		Globe Seamless Tube Co.	Milwaukee, Wis.	AC
31	450	300		d.c.	10″ Tube Mill	Coupled	1911	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	CW
32	500	234		60	Tube Mill	Coupled	1922	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
33	500	234		60	Tube Mill	Coupled	1922	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
34	500	250		50	Tube Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
35	500	250		60	Tube Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
36	500	300–450	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
37	500	450	2200	60 cy.	Tube Mill	Geared	1916	Ohio Seamless Tube Co.	Shelby, Ohio	GE
38	500	450	2200	60 cy.	Tube Mill	Geared	1919	Ohio Seamless Tube Co.	Shelby, Ohio	GE
39	500	500	550	25 cy.	Tube Rolling Mill	Geared	1917	Baltimore Tube Co.	Baltimore, Md.	W
40	600	300		60	Tube Mill	Coupled	1917	Pittsburgh Steel Products Co.	Monessen, Pa.	CW
41	600	300		60	Tube Mill	Coupled	1918	Pittsburgh Steel Products Co.	Allenport, Pa.	CW
42	600	360	2200	60 cy.	Tube Mill	Geared	1914	Standard Seamless Tube Co.	Economy, Pa.	GE
43	700	300–400	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
44	750	295	6600	25 cy.	Seamless Mill	Geared	1923	Gary Tube Co.	Gary, Ind.	W
45	750	353	2200	60 cy.	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
46	750	353	2200	60 cy.	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
47	750	353	2200	60 cy.	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W
48	800	109	2200	60 cy.	2—21″ Rolls	Coupled	1924	Globe Steel Tube Co.	Milwaukee, Wis.	AC
49	800	225	2200	60 cy.	Roughing Mill Tube	Geared	1916	Standard Seamless Tube Co.	Economy, Pa.	GE
50	1000	240	220	60 cy.	Tube Mill	Geared		Globe Seamless Tube Co.	Milwaukee, Wis.	AC
51	1000	240		60	Tube Mill		1917	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	CW
52	1000	300–400	230	d.c.	Lap Welding Mill	Coupled Rope Drive & Coupled		Gary Tube Co.	Gary, Ind.	AC
53	1200	257	4600	60 cy.	Tube Mill			Detroit Seamless Tube Co.	Detroit, Mich.	GE
54	1200	294	2200	60 cy.	Tube Rolling Mill	Geared	1915	National Tube Co.	Ellwood City, Pa.	W
55	1800	250	2200	60 cy.	Tube Rolling Mill	Direct	1915	National Tube Co.	Ellwood City, Pa.	W

STRIP AND HOOP MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300–225–165	335–225–165	6600	25 cy.	12″ Hot Strip Mill	Geared	1920	Illinois Steel Co.	Gary, Ind.	GE
2	300	360		50	10″ Strip Mill	Coupled	1923	Pittsburgh Steel Company	Glassport, Pa.	CW
3	300	600	2200	60 cy.	10″ Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE
4	350	242	2200	25 cy.	Cold Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
5	350	345	440	60 cy.	21″ Plate (Cold Roll.) Mill	Geared	1910	Oliver Iron & Steel Co.	Wilson Station, Pa.	W
6	350	490	6400	25 cy.	24″ Flat (Edging) Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
7	400–400	275–500	550	d.c.	12″ Hot Strip Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	GE
8	400	360		60	8″ Strip Mill	Coupled	1923	Pittsburgh Steel Company	Glassport, Pa.	CW
9	450	440–350	2200	60 cy.	Cont. Hoop (Fin.) Mill	Direct	1920	Connors Steel Co.	Birmingham, Ala.	W
10	450	450–600	230	d.c.	12″ Cold Strip (2 Tandem Stds. Roughing) Mill	Geared	1915	Superior Steel Co..	Carnegie, Pa.	W
11	450	450–600	230	d.c.	12″ Cold Strip (2 Tandem Stds. Finishing) Mill	Geared	1915	Superior Steel Co.	Carnegie, Pa.	W
12	450	700–595	2200	60 cy.	Cont. Hoop (Fin.) Mill	Direct	1920	Connors Steel Co.	Birmingham, Ala.	W
13	500–500	250–325	230	d.c.	8″ Hoop Mill	Direct	1909	Atlantic Steel Co.	Atlanta, Ga.	GE
14	500	250–500	230	d.c.	9″ Hoop (Finishing) Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
15	500–500	400–600	230	d.c.	Hoop Mill	Geared	1920	Atlantic Steel Co.	Atlanta, Ga.	GE
16	500	450		50	Hoop Mill	Geared	1912	Carnegie Steel Company	Pittsburgh, Pa.	CW
17	550	320–206	2200	60 cy.	10″ Hoop Mill	Direct	1917	Atlantic Steel Co.	Atlanta, Ga.	W
18	600–600	150–250	575	d.c.	6″ Hot Strip Mill	Direct	1913	American Steel & Wire Co.	Cleveland, Ohio	GE
19	600–600	225–425	550	d.c.	12″ Hot Strip Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	GE
20	600	390	440	60 cy.	Cold Strip Mill	Geared	1917	Stanley Works	New Haven, Conn.	W
21	600–600	720–360	6600	50 cy.	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
22	700	875	2200	60 cy.	Cont. Hoop (Rough.) Mill	Geared	1920	Connors Steel Co.	Birmingham, Ala.	W
23	700	875	2200	60 cy.	Cont. Hoop (Inter.) Mill	Geared	1920	Connors Steel Co.	Birmingham, Ala.	W
24	750	257		50	10″ Strip Mill	Coupled	1923	Pittsburgh Steel Company	Glassport, Pa.	CW
25	750–625–460	360–300–220	6600	25 cy.	12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
26	750–750	360–860	600	d.c.	14″ Cont. Mill	Geared	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
27	750–600–400	473–375–278	6600	25 cy.	12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
28	800–800	200–400	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
29	800–800	214–167	6600	25 cy.	16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
30	800–800	231–462	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
31	800	250–500	230	d.c.	14″ and 9″ Hoop Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
32	800–800	256–512	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
33	800–800	275–550	600	d.c.	14″ Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
34	800–800	315–210	575	d.c.	6″ Hot Strip Mill	Direct	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
35	800–800	390–260	575	d.c.	6″ Hot Strip Mill	Direct	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
36	800	585–292	6600	60 cy.	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
37	800–800–800	720–600–480	2200	50 cy.	12″ Hot Strip Mill	Geared	1920	Canadian Electric Steel Co.	Montreal, Canada	GE
38	800–800–800	720–600–480	2200	60 cy.	12″ Hot Strip Mill	Geared	1920	Canadian Electric Steel Co.	Montreal, Canada	GE
39	900–710–620	325–257–182	2300	60 cy.	10″ Hoop Mill	Geared	1918	Acme Steel Goods Co.	Riverdale, Ill.	GE
40	1000	50–100	600	d.c.	24″ Flat (Rough.) Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	W
41	1000	214–150	6400	25 cy.	24″ Flat (Finishing) Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	W
42	1000	705	2200	60 cy.	16″ Strip Mill	Geared	1920	Central Steel Co.	Massillon, Ohio	W
43	1200–1200–1200	450–360–270	2300	60 cy.	9″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
44	1200–1200–1200	450–360–270	2300	60 cy.	9″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
45	1200–1200–1200	450–360–270	2300	60 cy.	9″ Hot Strip Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
46	1200–1000–800	450–375–300	6600	25 cy.	8″ Hoop Mill, No. 8	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
47	1200–1000–800	450–375–300	6600	25 cy.	8″ Hoop Mill, No. 9	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
48	1200–1000–800	450–375–300	6600	25 cy.	18″ Band Mill, No. 13	Geared	1919	Carnegie Steel Co.	Youngstown, Ohio	GE
49	1200	505–303	6600	60 cy.	16″ Band Mill	Geared	1919	Weirton Steel Co.	Weirton, W. Va.	W
50	1200	590–450	2200	60 cy.	Duo and Bull Head Mill	Geared	1916	Central Steel Co.	Massillon, Ohio	W
51	1200	590	2200	60 cy.	22″ Strip Mill	Geared	1918	Harrisburg Pipe & Pipe Bending Co.	Harrisburg, Pa.	W
52	1250–1250	175–350	600	d.c.	14″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
53	1250–1250	175–350	600	d.c.	14″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
54	1500	125–250	230	d.c.	14″ Band Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
55	1500	125–250	240	d.c.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
56	1500	125–250	240	d.c.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
57	1500	257	2200	25 cy.	10″ Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE
58	1500–1500	280–420	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
59	1500–1500	280–420	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
60	1500–1500	280–420	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
61	1500	360	2200	60 cy.	10″ Hot Strip Mill	Direct	1919	Superior Steel Co.	Carnegie, Pa.	GE

STRIP AND HOOP MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
62	1500–1200–1500	450–360–270	2300	60 cy.	16″ Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
63	1500	505	6600	60 cy.	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
64	1500	514	6600	60 cy.	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
65	1500–1500	514–237	6600	60 cy.	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
66	1500	514	6600	60 cy.	Hot Strip Mill	Geared	1924	Weirton Steel Co.	Weirton, W. Va.	AC
67	1500–1500	514–237	6600	60 cy.	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
68	1500	705	2200	60 cy.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
69	1500	705	2200	60 cy.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
70	1650–1205	235–187.5–	6600	25 cy.	20″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
71	1700–1700	90–140	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
72	1700–1700	90–205	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
73	1800–1800	115–230	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
74	1800–1800	115–230	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
75	1800–1800	115–230	600	d.c.	20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
76	1800	165–350	240	d.c.	Strip Mill	Direct	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
77	1800	165–350	240	d.c.	Strip Mill	Direct	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
78	1800	214	2200	25 cy.	6″ Hot Strip Mill	Rope	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
79	1800–1500–1200	240–200–160	2300	60 cy.	10″ Hoop Mill	Belt	1918	Acme Steel Goods Co.	Riverdale, Ill.	GE
80	1800–1500–1200	450–375–300	6600	25 cy.	10″ Hoop Mill, No. 11	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
81	1800	500	6600	25 cy.	20″ Hot Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
82	2000–1700	210–680	600	d.c.	14″ Continuous Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
83	2000–2000–1600	450–360–270	2200	60 cy.	16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
84	2000–2000–1600	450–360–270	2200	60 cy.	16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
85	2000–2000–1600	450–360–270	2200	60 cy.	16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
86	2100–2100	150–310	600	d.c.	14″ Cont. Strip Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
87	2100–1600	150–460	600	d.c.	14″ Cont. Strip Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
88	2500	352–176	6600	60 cy.	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
89	2750–2240–1750	262–214–167	6600	25 cy.	12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
90	3000	125	6400	25 cy.	20″ Flat Mill	Coupled		American Steel & Wire Co.	Cleveland, Ohio	AC
91	3000–3000[b]	200–360	600	d.c.	14″ Continuous Mill	Geared	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
92	3000–2500–2000	300–250–200	6600	25 cy.	18″ Band Mill, No. 13	Direct	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
93	3000–2500–2000	300–250–200	6600	25 cy.	12″ Hoop Mill, No. 13	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
94	5500–4400–3400	170–136–105	6600	25 cy.	20″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE

COLD ROLL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	300	230	d.c.	Cold Roll Mill	Geared	1914	Trumbull Steel Co.	Warren, Ohio	W
2	300	300	230	d.c.	Cold Roll Mill	Geared	1920	Alan Wood Iron & Steel Co.	Conshohocken, Pa.	W
3	300	340	2200	60 cy.	Cold Roll Mill	Geared	1921	Newton Steel Co.	Newton Falls, Ohio	W
4	300	350	2200	60 cy.	Cold Roll Mill	Geared	1915	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
5	300	350	2200	60 cy.	Cold Roll Mill	Geared	1916	Wheeling Steel Corporation	Wheeling, W. Va.	W
6	300	350	2200	60 cy.	Cold Roll Mill	Geared	1916	Wheeling Steel Corporation	Portsmouth, Ohio	W
7	300	350	2200	60 cy.	Cold Roll Mill	Geared	1916	Wheeling Steel Corporation	Portsmouth, Ohio	W
8	300	350	2200	60 cy.	Cold Roll Mill	Geared	1916	Wheeling Steel Corporation	Portsmouth, Ohio	W
9	300	350	2200	60 cy.	Cold Roll Mill	Geared	1916	Wheeling Steel Corporation	Portsmouth, Ohio	W
10	300	352	2200	60 cy.	Cold Roll Mill	Direct	1923	Sharon Steel Hoop Co.	Youngstown, Ohio	W
11	300	353	2200	60 cy.	Cold Rolls	Geared		Reeves Mfg. Co.	Dover, Ohio	GE
12	300	360	2200	60 cy.	Sheet Mill—Cold Rolls	Geared	1922	U. Alloy Steel Corp., Berger Div.	Canton, Ohio	GE
13	300	360	2300	60 cy.	Cold Rolls	Geared	1923	Ashtabula Steel Co.	Ashtabula, Ohio	GE
14	300	363	220	25 cy.	Cold Roll Mill	Geared	1919	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
15	300–300	400–800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
16	300–300	400–800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
17	300–300	400–800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
18	300–300	400–800	230	d.c.	Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
19	300–300	400–800	230	d.c.	20x24″ Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
20	300–300	400–800	230	d.c.	20x24″ Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
21	300–300	400–800	230	d.c.	20x24″ Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
22	300–300	400–800	230	d.c.	20x24″ Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
23	300	440	2200	60 cy.	Cold Roll Mill	Geared	1924	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
24	300	440	2200	60 cy.	Cold Roll Mill	Geared	1924	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
25	300	485	2200	25 cy.	Cold Roll Mill	Direct	1916	Halcomb Steel Co.	Syracuse, N. Y.	W
26	300	514	550	60 cy.	14″ Cold Strip Mill	Geared	1922	Wallingford Steel Co.	Wallingford, Conn.	GE
27	300	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
28	300	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
29	300	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
30	300	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
31	300	600	2200	60 cy.	Cold Sheet Mill Rolls	Geared	1923	Falcon Steel Co.	Niles, Ohio	GE
32	350	145	2200	60 cy.	Cold Roll Mill	Rope	1912	Massillon Rolling Mill Co.	Massillon, Ohio	W
33	350	345	440	60 cy.	Cold Roll Mill	Geared	1910	Oliver Iron & Steel Co.	Wilson, Pa.	W
34	350	360	2200	60 cy.	Sheet Mill—Cold Rolls	Geared	1919	Falcon Steel Co.	Niles, Ohio	GE
35	375	430–860	230	d.c.	20″ Cold Roll Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
36	375	430–860	230	d.c.	20″ Cold Roll Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
37	375	430–860	230	d.c.	20″ Cold Roll Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
38	375	430–860	230	d.c.	20″ Cold Roll Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
39	375	430–860	230	d.c.	20″ Cold Roll Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	W
40	400	290	2200	60 cy.	Cold Roll Mill	Geared	1916	Youngstown Sheet & Tube Co.	Warren, Ohio	W
41	400	290	2200	60 cy.	Cold Roll Mill	Geared	1917	Liberty Steel Co.	Warren, Ohio	W
42	400	360	2200	60 cy.	Sheet Mill, Cold Rolls	Geared	1916	Mahoning Valley Steel Co.	Niles, Ohio	GE
43	400	360	2200	60 cy.	Sheet Mill, Cold Rolls	Geared	1916	Mahoning Valley Steel Co.	Niles, Ohio	GE
44	400	360	2200	60 cy.	Cold Roll Sheet Mill	Geared	1918	Reeves Mfg. Co.	Canal Dover, Ohio	GE
45	400	360	440	60 cy.	Cold Strip Mill	Geared	1921	Am. Tube and Stamping Co.	Bridgeport, Conn.	GE
46	400	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
47	400	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
48	400	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
49	400	575	2200	60 cy.	Cold Roll Mill	Geared	1922	American Rolling Mill Co.	Ashland, Ky.	W
50	450	514	550	60 cy.	14″ Cold Strip MillP	Geared	1922	Wallingford Steel Co.	Wallingford, Conn.	GE
51	500	250	6600	25 cy.	Sheet Mill Cold Rolls	Geared	1919	Bethlehem Steel Co.	Sparrows Point, Md.	GE
52	500	350	2200	60 cy.	Cold Roll Mill	Geared	1916	Mansfield Sheet & Tin Plate Co.	Mansfield, Ohio	W
53	500	350	440	60 cy.	Cold Roll Mill	Geared	1916	Andrews Steel Co.	Newport, Ky.	W
54	500	360	2200	60 cy.	Sheet Mill, Cold Rolls	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
55	500	360	2200	60 cy.	Sheet Mill, Cold Rolls	Geared	1920	Central Steel Co.	Massillon, Ohio	GE
56	500	360	2200	60 cy.	Sheet Mill, Cold Rolls	Geared	1920	Republic Iron & Steel Co.	Youngstown, Ohio	GE
57	500	442	2200	60 cy.	Cold Roll Mill	Geared	1922	Follansbee Brothers Co.	Toronto, Ohio	W
58	500	450	550	60 cy.	12″ Cold Roll Mill	Geared	1914	Worcester Pressed Steel Co.	Worcester, Mass.	GE
59	600	150	550	60 cy.	Sheet Mill, Cold Rolls	Rope	1909	Weirton Steel Co.	Weirton, W. Va.	GE
60	700	502	2200	60 cy.	Cold Roll Mill	Geared	1917	Carnahan Tin Plate & Sheet Co.	Canton, Ohio	W
61	750	100	2200	25 cy.	Tin Mill, Cold Rolls	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE
62	750	100	2200	25 cy.	Tin Mill, Cold Rolls	Geared	1915	American Sheet & Tin Plate Co.	Gary, Ind.	GE

COLD ROLL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
63	750	125	2200	25 cy.	Tin Mill, Cold Rolls	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
64	750	125	2200	25 cy.	Tin Mill, Cold Rolls	Rope	1915	McKeesport Tin Plate Co.	McKeesport, Pa.	GE
65	750	240	2200	60 cy.	Sheet Mill, Cold Rolls	Geared	1919	Wheeling Steel Corp.	Steubenville, Ohio	GE
66	750	300-600	230	d.c.	Cold Rolling Mill	Geared	1924	International Nickel Co.	Huntington, W. Va.	AC
67	800	375	2200	25 cy.	Sheet Mill, Cold Rolls	Geared	1919	Eastern Rolling Mills Co.	Baltimore, Md.	GE
68	1200	367	2200	25 cy.	Cold Roll Mill	Geared	1916	Bethlehem Steel Co.	Sparrows Point, Md.	W

MERCHANT MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300-300	187.5-112.5	2200	25 cy.	12" Merchant Mill	Direct	1914	Bethlehem Stee Co.	Lebanon, Pa.	GE
2	300-300	187.5-112 5	2200	25 cy.	12" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
3	300	225-300	230	d.c.	Marchant (Finishing) Mill	Direct	1919	Pacific Coast Steel Co.	Seattle, Wash.	W
4	300	257		60	Merchant Mill		1917	Tennessee Coa., Iron & R. R. Co.	Bessemer, Ala.	CW
5	300-300	300-180	2200	25 cy.	10" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
6	300	300		60	Merchant Mill		1917	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	CW
7	300-300	315-630	230	d.c.	8" Merchant Mlli	Direct	1919	Donner Steel Co.	Buffalo, N. Y.	GE
8	300	350-500		d.c.	Merchant Mill		1915	Buffalo Bolt Company	N. Tonawanda, N. Y.	CW
9	300	365	2200	25 cy.	8" Merchant Mill	Direct	1909	Bethlehem Steel Co.	Johnstown, Pa.	W
10	300	440	2200	60 cy.	Merch. (Roughing) Mill	Coupled		Ft. Wayne Rolling Mill Co.	Ft. Wayne, Ind.	AC
11	300	450	2200	60 cy.	8" Merchant Mill		1917	Llewellyn Iron Works	Los Angeles, Cal.	GE
12	300-300	500-300	2200	25 cy.	9" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
13	300-300	500-300	2200	25 cy.	8" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
14	300	500	2080	25 cy.	9" Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	GE
15	300-150	590-292	2200	60 cy.	9" Merchant (Fin.) Mill	Geared	1920	Cleveland Hardware Co.	Cleveland, Ohio	W
16	300	600	2200	60 cy.	Merchant Mill	Geared	1916	Tennessee Coal, Iron & R. R. Co.	Bessemer, Ala.	GE
17	300	720	440	60 cy.	14" Merchant Mill	Geared	1913	Bourne Fuller Co.	Cleveland, Ohio	GE
18	300	720	440	60 cy.	12" Merchant Mill	Geared	1919	The Stanley Works	New Britain, Conn.	GE
19	300	750	3000	50 cy.	Merchant Mill	Geared	1923	Cons. Rolling Mills Co.	Mexico City, Mex.	GE
20	300-200	920-360	220	d.c.	Merchant Mill	Direct	1919	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
21	350-350	150-100	6600	25 cy.	12" Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
22	350	200-300	250	d.c.	9" Merchant Mill	Direct	1919	National Farming Machinery, Ltd.	Montmagny, P. Q.	W
23	350-350	240-480	240	d.c.	10" Merchant Mill	Direct	1923	LaClede Steel Co.	St. Louis, Mo.	GE
24	350	250-325	230	d.c.	9" Merchant Mill	Direct	1921	Wayne Steel Co.	Erie, Pa.	W
25	350-235	300-200	6600	25 cy.	Merchant Mill	Geared	1920	Illinois Steel Co.	Gary, Ind.	GE
26	350-350	360-240	240	d.c.	10" Merchant Mill	Direct	1911	LaClede Steel Co.	St. Louis, Mo.	GE
27	350-350	375-214	6600	25 cy.	9" Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
28	350	480	2200	25 cy.	12" Roughing Stand Mill	Geared	1923	Halcomb Steel Co.	Syracuse, N. Y.	W
29	350	420	2200	50 cy.	Merchant Mill	Geared	1919	Southern California Iron & SteelCo.	Los Angeles, Cal.	W
30	350	524-850	230	d.c.	18" Blading Mill	Geared	1924	W. E. & M. Co.	South Phila. Works	W
31	350	580	2200	60 cy.	Merchant Mill	Geared	1916	Copper Clad Steel Co.	Pittsburgh, Pa.	W
32	350	590	2200	60 cy.	12" Merchant Mill	Geared	1918	Indianapolis & Eastern TractionCo.	Indianapolis, Ind.	W
33	350	700	2200	60 cy	Merchant Mill	Geared	1918	Kilby Car & Foundry Co.	Anniston, Ala.	W
34	400	200-300	230	d.c.	9" Merchant Mill	Direct	1914	United Alloy Steel Corp.	Canton, Ohio	W
35	400	210-350		d.c.	Merchant Mill		1915	Buffalo Bolt Company	N. Tonawanda, N. Y.	CW
36	400-400	250-500	230	d.c.	10" Merchant Mill	Direct	1920	Timken Roller Bearing Co.	Canton, Ohio	GE
37	400	300	2200	25 cy.	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
38	400	300	2200	25 cy.	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
39	400	300	2500	25 cy.	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
40	400	300	2200	25 cy.	Merchant Mill	Rope	1909	American Steel & Wire Co.	Cleveland, Ohio	GE
41	400-500	300-600	600	d.c.	9" Finishing Mill	Geared	1921	Driver Harris Co.	Harrison, N. J.	W
42	400	385	550	40 cy.	22" Puddle Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
43	400	400-450	220	d.c.	8" Merchant Mill	Direct	1911	Illinois Steel Co.	Milwaukee, Wis.	W
44	400	485	440	25 cy.	9" Merchant Mill	Geared	1915	Hess Steel Corporation	Baltimore, Md.	W
45	400	585	4000	60 cy.	14" Merchant Mill	Geared	1922	Calumet Steel Co.	Chicago, Ill.	W
46	400	600	440	60 cy.	12" Merchant Mill	Geared	1919	The Stanley Works	New Britain, Conn.	GE
47	450	354-230	2200	60 cy.	8" Merchant Mill	Direct	1919	Bourne-Fuller Co.	Cleveland, Ohio	W
48	450	440	2200	60 cy	Merchant Mill	Geared	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
49	450	450	2080	60 cy.	18" Merchant Mill	Geared	1919	Columbia Steel Co.	Pittsburgh, Cal.	GE
50	450	450	2080	60 cy.	12" Merchant Mill	Geared	1919	Columbia Steel Co.	Pittsburgh, Cal.	GE
51	450	585	2200	50 cy.	14" Merchant Mill	Geared	1918	Columbia Steel Co.	Los Angeles, Cal.	W
52	450	730-490	4000	25 cy.	10" Merchant Mill	Geared	1917	Atlas Steel Corporation	Dunkirk, N. Y.	W
53	450-360	870-695	2200	60 cy.	10" Merchant Mill	Geared	1913	Cleveland Hardware Co.	Cleveland, Ohio	W
54	450-360	875-700	2200	60 cy.	9" Merchant Mill	Geared	1915	National Lock Washer Co.	Riverside, N. J.	W
55	475-350	240-181	440	25 cy.	10" Merchant Mill	Direct	1914	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
56	485-360	870-695	2200	60 cy.	10" Merchant Mill	Geared	1915	Old Dominion Iron & Nail Co.	Richmond, Va.	W
57	500	88	6600	25 cy.	16" Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
58	500-385-250	130-100-65	440	25 cy.	14" Merchant Mill	Direct	1923	Halcomb Steel Co.	Syracuse, N. Y.	GE
59	500	150-225	250	d.c.	12" Merchant Mill	Direct	1919	National Farming Machinery, Ltd.	Montmagny, P. Q.	W
60	500	184	2200	25 cy.	12" Merchant Mill	Rope	1905	Ontario Iron & Steel Co.	Welland, Ont.	W
61	500	184	2200	25 cy.	16" Merchant Mill	Direct	1908	Bethlehem Steel Co.	Johnstown, Pa.	W
62	500	190	230	d.c.	18" Tandem Mer. (Roughing) Mill	Rope	1910	Sharon Steel Hoop Co.	Sharon, Pa.	GE
63	500-330	242-161	440	25 cy.	16" and 10" Merchant Mill	Direct & Rope	1913	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
64	500	244	2200	25 cy.	10" Merchant Mill	Direct	1908	Bethlehem Steel Co.	Johnstown, Pa.	W
65	500	250-350	600	d.c.	9" Merchant Mill	Direct	1921	Missouri Rolling Mill Co.	St. Louis, Mo.	W
66	500	292	4000	60 cy.	8" Merchant Mill	Direct	1920	Calumet Steel Co.	Chicago, Ill.	W
67	500	320	2200	60 cy.	12" Merchant Mill	Geared	1919	Baltimore & Ohio Railroad	Cumberland, Md.	W
68	500-500	327-200	440	60 cy.	9" Merchant Mill	Direct	1913	Union Rolling Mills Co.	Cleveland, Ohio	GE
69	500	360	2200	25 cy.	8" Merchant Mill	Direct	1912	Bethlehem Steel Co.	Johnstown, Pa.	W
70	500	435	440	60 cy.	8" Merchant Mill	Rope	1911	Carnegie Steel Co., Painter Mill	Pittsburgh, Pa.	W
71	500	435	440	60 cy.	8" Merchant Mill	Rope	1912	Carnegie Steel Co., Painter Mill	Pittsburgh, Pa.	W
72	500	435	440	60 cy.	8" Merchant Mill	Rope	1912	Carnegie Steel Co., Painter Mill	Pittsburgh, Pa.	W
73	500	435	440	60 cy.	9" Merchant (Fin.) Mill	Belted	1914	Carnegie Steel Co., Painter Mill	Pittsburgh, Pa.	W
74	500	435	440	60 cy.	10" Merchant (Fin.) Mill	Belted	1914	Carnegie Steel Co., Painter Mill	Pittsburgh, Pa.	W
75	500	435	2200	60 cy.	Merchant Mill	Geared	1916	Seymour Manufacturing Co.	Waterbury, Conn.	W
76	500	480-250		d.c.	Merchant Mill	Coupled	1923	Buffalo Bolt Company	N. Tonawanda, N. Y.	CW
77	500	450	2300	60 cy.	Merchant Mill	Geared	1916	Pacific Coast Steel Co.	San Francisco, Cal.	GE
78	500	487	6600	25 cy.	8" Merchant Mill	Direct	1913	Minnesota Steel Co.	Duluth, Minn.	W
79	500-500-500	500-375-265	2200	25 cy.	10" Merchant Mill	Direct & Belt	1916	Donner Steel Co.	Buffalo, N. Y.	GE
80	500	500	2300	25 cy.	18" Merchant Mill	Geared	1919	Halcomb Steel Co.	Syracuse, N. Y.	GE
81	500	575-865	2200	60 cy.	10" Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	W
82	500	575-865	2200	60 cy.	10" Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	W
83	500	600	2200	60 cy.	Merchant Mill	Geared	1923	Taunton-New Bedf'd Cop. Co.	Taunton, Mass.	GE
84	500-330	730-485	2200	50 cy.	8" Merchant Mill	Geared	1919	Southern California Iron & SteelCo.	Los Angeles, Cal.	W
85	500-250	750-375	3000	50 cy.	Merchant Mill	Geared	1923	Consolidated Rolling Mills Co.	Mexico City, Mex.	GE
86	500-400	775-585	550	40 cy.	10" Merchant Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W

MERCHANT MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
87	500	870	2200	60 cy.	16″ Merchant Mill	Geared	1919	McConway Torley Co.	Pittsburgh, Pa.	W
88	500–400	875–700	550	60 cy.	10″ & 14″ Merchant Mill	Geared	1916	The Texas Steel Co.	Fort Worth, Tex.	W
89	500	888–540	6600	60 cy.	11″ Finishing Stand. Mill	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
90	500–250	890–513 440–256	2200	60 cy.	10″ Merchant Mill	Geared	1919	Hunter Crucible Steel Co.	Cleveland, Ohio	W
91	525	125	2200	25 cy.	Merchant Mill	Rope	1910	American Sheet & Tin Plate Co.	Gary, Ind.	GE
92	550	120–300	250	d.c.	11″ Merchant Mill	Direct	1923	Firth Sterling Steel Co.	McKeesport, Pa.	W
93	550–360	875–585	2200	60 cy.	12″ Merchant Mill	Geared	1917	Norfolk & Western Railroad Co.	Roanoke, Va.	W
94	550	880	2200	60 cy.	16″ Merchant Mill	Geared	1919	Danville Structural Tube Co.	Danville, Pa.	W
95	550	880	2200	60 cy.	Merchant Mill	Geared	1921	Danville Structural Tube Co.	Danville, Pa.	W
96	575	300–214	6600	25 cy.	10″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
97	575–575	375–250	6600	25 cy.	8″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
98	600	200–300	230	d.c.	9″ Merchant Mill	Direct	1914	United Alloy Steel Corporation	Canton, Ohio	W
99	600	200–300	230	d.c.	9″ Merchant Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
100	600–600	214– 93	6600	25 cy.	12″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
101	600–525	250–125	2200	25 cy.	16″ & 14″ Merchant Mill	Direct & Rope	1913	Bethlehem Steel Co.	Steelton, Pa.	GE
102	600–400–200	321–214–107	440	25 cy.	9″ Merchant Mill	Direct	1923	Halcomb Steel Co.	Syracuse, N. Y.	GE
103	600	365	6600	25 cy.	10″ Merchant Mill	Direct	1913	Minnesota Steel Co.	Duluth, Minn.	W
104	600–400	375–210	2200	25 cy.	9″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
105	600	390	440	60 cy.	20″ Merchant Mill	Geared	1916	Stanley Works	New Haven, Conn.	W
106	600–600–600	469–375–281	2200	25 cy.	8″ Merchant Mill	Direct	1919	Donner Steel Co.	Buffalo, N. Y.	GE
107	600	485	2200	25 cy.	10″ Merchant (Fin.) Mill	Direct	1912	Laclede Steel Co.	Alton, Ill.	W
108	600	485	440	25 cy.	20″ Merchant Mill	Geared	1915	Hess Steel Corporation	Baltimore, Md.	W
109	600	500	2200	60 cy.	20″ Merchant Mill	Geared	1916	Carpenter Steel Co.	Reading, Pa.	W
110	600	500	2200	60 cy.	16″ Merchant Mill	Geared	1917	Central Steel Co.	Massillon, Ohio	W
111	600	500	440	25 cy.	16″ Merchant Mill	Geared	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
112	600	585–325	550	40 cy.	16″ Merchant Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
113	600–500–400	600–500–400	2200	25 cy.	Merchant Mill, No. 10	Direct	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
114	650	160	440	60 cy.	14″ Guide Mill	Coupled		Withrow Steel Co.	Neville Island, Pa.	AC
115	650	184	6600	25 cy.	18″ Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
116	650	184	6600	25 cy.	14″ Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
117	650	200	440	60 cy.	14″ Guide Mill	Coupled		Withrow Steel Co.	Neville Island, Pa.	AC
118	650	210	6600	25 cy.	12″ Merchant Mill	Geared	1909	Indiana Steel Co.	Gary, Ind.	W
119	650	293	2200	60 cy.	9″ Merchant Mill	Rope	1919	Harrisburg Pipe & Pipe Bending Co.	Harrisburg, Pa.	W
120	650	500	6600	25 cy.	10″ Merchant Mill	Direct	1916	Illinois Steel Co.	Gary, Ind.	GE
121	650	500	6600	25 cy.	10″ Merchant Mill	Direct	1916	Illinois Steel Co.	Gary, Ind.	GE
123	700	135–360	240	d.c.	Merchant Mill	Direct	1923	Atlas Steel Corporation	Dunkirk, N. Y.	W
124	700	187	2200	25 cy.	14″ Merchant Mill	Direct	1920	Donner Steel Co.	Buffalo, N. Y.	GE
125	700	364	2200	25 cy.	8″ Merchant Mill	Direct	1912	Laclede Steel Co.	Alton, Ill.	W
126	700–600–400	400–300–200	2200	25 cy.	Merchant Mill, No. 10	Direct	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
127	700–600–400	400–300–200	2200	25 cy.	Merchant Mill, No. 10	Belt	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
128	700	480–290	2200	25 cy.	12″ Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	W
129	700	730–490	4000	25 cy.	14″ Merchant Mill	Geared	1916	Atlas Steel Corporation	Dunkirk, N. Y.	W
130	700	735	4000	25 cy.	14″ Merchant Mill	Geared	1920	Atlas Steel Corporation	Dunkirk, N. Y.	W
131	700	880–530	2200	60 cy.	10″ Finishing Mill	Geared	1923	Crucible Steel Co. of America, Park Works	Pittsburgh, Pa.	W
127	750	277	2200	60 cy.	18″ Merchant Mill	Geared	1915	Pacific Coast Steel Co.	San Francisco, Cal.	GE
128	800	163	2200	25 cy.	22″ Merchant Mill	Rope	1905	Ontario Iron & Steel Co.	Welland, Ont.	W
129	800–800	214–167	6600	25 cy.	16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
130	800	257	2200	60 cy.	18″ Merchant Mill	Geared	1919	Columbia Steel Co.	Pittsburgh, Cal.	GE
131	800	268	2200	60 cy.	14″ & 10″ Merchant Mill	Rope	1912	United Alloy Steel Corporation	Canton, Ohio	W
132	800	320	440	60 cy.	9″ Merchant Mill	Belted	1914	Carnegie Steel Co. Painter Mill	Pittsburgh, Pa.	W
133	800	320	440	60 cy.	10 ″ Merchant Mill	Belted	1914	Carnegie Steel Co. Painter Mill	Pittsburgh, Pa.	W
134	800	350–700	600	d.c.	20″ Merchant (Breakd'n)	Geared	1921	Driver Harris Co.	Harrison, N. J.	W
135	800	353	2200	60 cy.	12″-5 Stand. Merch. Mill	Belt		United Steel Co.	Everett, Wash.	W
136	800	367	2200	25 cy.	8″ Merchant Mill	Direct	1917	Donner Steel Co.	BuZalo, N. Y.	W
137	800	375	2200	25 cy.	Merchant Mill	Geared	1920	Bethlehem Steel Co.	Johnstown, Pa.	GE
138	800	400–600	600	d.c.	16″ Merchant Mill	Geared	1921	Missouri Rolling Mill Co.	St. Louis, Mo.	W
139	800	410–720	230	d.c.	16″ Merchant (Rougher)	Geared	1923	Timken Roller Bearing Co.	Canton, Ohio	W
140	800	440	2200	60 cy.	18″ Merchant (Fin.) Mill	Geared	1918	Canton Sheet Steel Co.	Canton, Ohio	W
141	800	705	2200	60 cy.	12″ Merchant Mill	Geared	1919	McConway Torley Co.	Pittsburgh, Pa.	W
142	800	730–365	2200	50 cy.	12″ Merchant Mill	Geared	1917	Columbia Steel Co.	Los Angeles, Cal.	W
143	800	730–365	2200	50 cy.	22″ Merchant Mill	Geared	1917	Columbia Steel Co.	Los Angeles, Cal.	W
144	800	730–485	2200	50 cy.	12″ Merchant Mill	Geared	1919	Southern California Iron & Steel Co.	Los Angeles, Cal.	W
145	800	875–700	2200	60 cy.	16″ Merchant Mill	Geared	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
146	800	892–623	2200	60 cy.	20″ Merchant (Fin.) Mill	Geared	1918	Hoosier Rolling Mill	Terre Haute Ind.	W
147	800–800	900–720	2200	60 cy.	9″ Merchant Mill	Geared	1923	Knoxville Iron Co.	Knoxville, Tenn.	GE
148	800–800	900–720	2200	60 cy.	9″ Merchant Mill	Geared	1923	Knoxville Iron Co.	Knoxville, Tenn.	GE
149	850–570	214–143	6600	25 cy.	Merchant Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
150	850–850	214–187	6600	25 cy.	10″ Merchant Mill	Rope	1916	Illinois Steel Co.	Gary, Ind.	GE
151	850–850	214–187	6600	26 cy.	10″ Merchant Mill	Rope	1916	Illinois Steel Co.	Gary, Ind.	GE
152	800	94	2200	25 cy.	18″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
153	800	100	6600	25 cy.	16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
154	900–900	214–150	2200	25 cy.	12″ Merchant Mill	Direct	1910	Algoma Steel Co.	Sault St. Marie, Can.	GE
155	1000	184	2200	25 cy.	16″ Merchant Mill	Direct	1908	Bethlehem Steel Co.	Johnstown, Pa.	W
156	1000	250	2200	60 cy.	18″ Merchant Mill	Geared	1918	Canton Sheet & Steel Co.	Canton, Ohio	W
157	1000	295	2200	60 cy.	12″ Cont. and 10″ Merchant Mill	Rope & Direct	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
158	1000	300	2200	25 cy.	10″ Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	GE
159	1000	350–150	2200	60 cy.	12″ Merchant Mill	Direct	1918	Central Steel Co.	Massillon, Ohio	W
160	1000	365	2200	50 cy.	Merchant Mill	Geared	1923	Columbia Steel Co.	Torrance, Cal.	W
161	1000	375	4400	25 cy.	Merchant Mill	Geared	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
162	1000	518–800	250	d.c.	20″ Merchant Mill	Geared	1919	National Farming Machinery, Ltd.	Montmagny, P. Q.	W
163	1000	590–450	4000	60 cy.	14″ Merchant Mill	Geared	1920	Calumet Steel Co.	Chicago, Ill.	W
164	1000	590–450	4000	60 cy.	14″ Merchant Mill	Geared	1920	Calumet Steel Co.	Chicago, Ill.	W
165	1000	725	2200	25 cy.	12″ Merchant Mill	Geared	1922	Burlington Steel Co., Ltd.	Hamilton, Ont.	W
166	1100	294–205	2200	60 cy.	20″ Merchant Mill	Rope	1912	United Alloy Steel Corporation	Canton, Ohio	W
167	1200–1200	150–250	230	d.c.	12″ Merchant Mill	Direct	1920	Timken Roller Bearing Co.	Canton, Ohio	GE
168	1200	292	2200	25 cy.	12″ Cont. and 10″ Merchant Mill	Direct & Rope	1912	Laclede Steel Co.	Alton, Ill.	W
169	1200–1150–800	300–214–150	2200	25 cy.	Merchant Mill, No. 10	Geared	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
170	1200–1000–800	300 250–200	4400	25 cy.	14″ Merchant Mill	Direct	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
171	1200	368	2200	50 cy.	20″ Merchant Mill	Geared	1919	Southern California Iron & Steel Co.	Los Angeles, Cal.	W
172	1200	485	6400	25 cy.	12″ Merchant Mill	Geared	1916	American Steel & Wire Co.	Cleveland, Ohio	W
173	1200	590–407	2200	60 cy.	20″ Mer. (Rough.) Mill	Geared	1918	Hoosier Rolling Mill Co.	Terre Haute, Ind.	W
174	1250	375	2200	25 cy.	Merchants Bar Mill	Geared		Valley Steel Co.	Milwaukee, Wis.	AC
175	1250	712–430	6600	60 cy.	3 Stand 12″ Mill	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
176	1300– 900	214–140	2200	25 cy.	12″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
177	1300–1300	214–187	6600	25 cy.	10″ Merchant Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	GE
178	1400– 945	600–405	2200	60 cy.	21″ Merchant Mill	Geared	1915	Union Rolling Mills Co.	Cleveland, Ohio	GE
179	1500	80	2200	60 cy.	Morgan Cont. Mill	Coupled		Interstate Iron & Steel Co.	Chicago, Ill.	AC
180	1500	94	2200	25 cy.	18″ Merchant Mill	Direct	1910	Algoma Steel Co.	S'lt. St. Marie, Can.	GE
181	1500	218–145	6600	25 cy.	18″ Merchant Mill	Geared	1916	Carnegie Steel Co.	Duquesne, Pa.	W
182	1500	360–240	6600	25 cy.	12″ Merchant Mill	Rope	1916	Carnegie Steel Co.	Duquesne, Pa.	W
183	1500–1125	375–281	2200	25 cy.	10″ Merchant Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
184	1500	593	6600	60 cy.	6 Stand 11″ Mill	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
185	1500	890–540	6600	60 cy.	4 Stand 12″ Mill	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC

MERCHANT MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
186	1800-1800	250-125	6600	25 cy.	22" Merchant Mill	Geared	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
187	2000	94	2200	25 cy.	18" Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
188	2000	113	6600	25 cy.	12" Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
189	2000	163-113	6600	25 cy.	10" Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
190	2000	250-150	2200	60 cy.	Morgan Cont. Mill	Coupled		Interstate Iron & Steel Co.	Chicago, Ill.	AC
191	2500	113-91	6600	25 cy.	12" Merchant Mill	Direct	1909	Indiana Steel Co.	Gary, Ind.	W
192	2500-2080-1670	240-200-160	6300	50 cy.	12" Merchant Mill	Geared	1920	United Steel Co., Ltd.	Sheffield, Eng.	GE
193	3000	209	6600	25 cy.	12" and 16" Merchant Mill	Rope & Geared	1913	Minnesota Steel Co.	Duluth, Minn.	W
194	3000	375	2200	25 cy.	14" Merchant Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
195	3000	505-300	2200	60 cy.	12" Merchant Mill	Geared	1920	United Alloy Steel Corporation	Canton, Ohio	W
196	3200	91	6600	25 cy.	18" Merchant Mill	Geared	1909	Indiana Steel Co.	Gary, Ind.	W
197	3200	91	6600	25 cy.	14" Merchant Mill	Geared	1909	Indiana Steel Co.	Gary, Ind.	W
198	4000	147	6600	25 cy.	20" Merchant Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	W
199	4500-4500	67.5-110	500	d.c.	14" Merchant Mill	Geared	1923	Ford Motor Co.	Detroit, Mich.	GE
200	4500-4500	500-300	2200	25 cy.	14" Merchant Mill	Geared	1923	Inland Steel Co.	Indiana Harbor, Ind.	GE

WIRE MILLS

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	375	2200	25 cy.	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
2	300	375	2200	25 cy.	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
3	300	375	2200	25 cy.	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
4	300	375	2200	25 cy.	Wire Mill	Geared	1910	Bethlehem Steel Co.	Johnstown, Pa.	GE
5	300	375	2200	25 cy.	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
6	300	375	2200	25 cy.	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
7	300	375	2200	25 cy.	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
8	300	375	2200	25 cy.	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
9	300	375	2200	25 cy.	Wire Mill	Belt	1915	American Steel & Wire Co.	Cleveland, Ohio	GE
10	300	450	440	60 cy.	Wire Mill			American Steel & Wire Co.	Joliet, Ill.	AC
11	300	450	440	60 cy.	Wire Mill	Geared		American Steel & Wire Co.	Joliet, Ill.	AC
12	300	600	2300	60 cy.	Wire Mill	Geared	1917	American Steel & Wire Co.	Waukegan, Ill.	GE
13	325	600	2300	60 cy.	Wire Mill	Geared	1917	American Steel & Wire Co.	Waukegan, Ill.	GE
14	350	300		d.c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
15	350	300		d.c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
16	350	300		d.c.	Wire Draw Bench	Coupled	1908	Pittsburgh Steel Co.	Monessen, Pa.	CW
17	350	300		d.c.	Wire Draw Bench	Coupled	1911	Pittsburgh Steel Co.	Monessen, Pa.	CW
18	400	600	2200	60 cy.	Wire Rod Mill	Geared		Rome Wire Co.	Rome, N. Y.	AC
19	400	600	440	60 cy.	Wire Rod Mill	Coupled		Rome Wire Co.	Rome, N. Y.	AC
20	500	450	440	60 cy.	Wire Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
21	750	514	2200	60 cy.	Wire Rod Mill	Geared		Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
22	900	163	2200	60 cy.	Wire Rod Mill	Coupled		Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
23	1200	514	2200	60 cy.	Wire Rod Mill	Geared		Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
24	1300	360	2200	60 cy.	Wire Rod Mill	Coupled		Kokomo Steel & Wire Co.	Kokomo, Ind.	AC
25	1500	514	2200	60 cy.	Wire Rod Mill	Coupled		Kokomo Steel & Wire Co.	Kokomo, Ind.	AC

WHEEL MILLS

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	450-750	230	d.c.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
2	300	450-750	230	d.c.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
3	500	155-500	250	d.c.	Tyre Mill	Direct	1923	McConway Torley Co.	Pittsburgh, Pa.	W
4	500	214	6600	25 cy.	Axle Mill	Geared	1909	Illinois Steel Co.	Gary, Ind.	GE
5	500	375	2200	25 cy.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
6	750	130	550	d.c.	Wheel Mill	Direct	1915	Carnegie Steel Co.	McKees Rocks, Pa.	GE
7	750	160	550	d.c.	Wheel Mill	Direct	1916	Edgewater Steel Co.	Oakmont, Pa.	GE
8	750	160	550	d.c.	Wheel Mill	Direct	1916	Edgewater Steel Co.	Oakmont, Pa.	GE
9	750	160	550	d.c.	Wheel Mill	Direct	1919	Edgewater Steel Co.	Oakmont, Pa.	GE
10	900-720	200-160	220	d.c.	Wheel Mill	Geared	1906	Bethlehem Steel Co.	Johnstown, Pa.	GE
11	1000	137	6600	25 cy.	Wheel Mill	Geared		Illinois Steel Co.	Gary, Ind.	AC
12	1000	375	2200	25 cy.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
13	2000	375	2200	25 cy.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC

ALUMINUM, BRASS, COPPER AND NON-FERROUS MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300	290	2200	25 cy.	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
2	300	290	2200	25 cy.	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
3	300	290	2200	25 cy.	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
4	300	290	2200	25 cy.	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
5	300	300-600	230	d.c.	20" x 30" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
6	300	300-600	230	d.c.	20" x 30" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
7	300	300-600	230	d.c.	22" x 36" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
8	300	300-600	230	d.c.	22" x 36" Brass Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
9	300	300	2200	60 cy.	26" Cold Mill	Coupled		International Nickel Co.	Huntington, W. Va.	AC
10	300	435	2200	60 cy.	24" x 48" Copper Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
11	300	435	2200	60 cy.	18" Copper Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
12	300	500		50	Brass Mill	Coupled	1917	British American Metals Co.	Plainfield, N. J.	CW
13	300	514	440	60 cy.	Brass Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
14	300	514	550	60 cy.	Brass Sheet Mill	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
15	300	585	440	60 cy.	18" Copper (Rough.) Mill	Chain	1916	Standard Underground Cable Co.	Perth Amboy, N. J.	W
16	300	600	2200	60 cy.	Brass Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE

ALUMINUM, BRASS, COPPER AND NON-FERROUS MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
17	300	600	440	60 cy.	Brass Mill	Geared	1919	Bristol Brass Co.	Bristol, Conn.	GE
18	300	600	440	60 cy.	Brass Mill			Detroit Copper & Brass Co.	Detroit, Mich.	AC
19	350	250	440	25 cy.	Brass Mill	Geared	1921	Harrison Radiator Corp.	Lockport, N. Y.	GE
20	350–350	275–470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	GE
21	350–350	275–470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	GE
22	350–350	275–470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Co.	Kenosha, Wis.	GE
23	350–350	275–470	375	d.c.	Reversing Copper Mill	Geared	1922	Taunton-New Bedf'd Copper Co.	Taunton, Mass.	GE
24	350	400	2200	60 cy.	Wire Rod Mill	Geared		Taunton New Bedf'd Copper Co.	New Bedford, Mass.	AC
25	350	400	2200	60 cy.	Wire Rod Mill	Coupled		Taunton New Bedf'd Copper Co.	New Bedford, Mass.	AC
26	350	400	2200	60 cy.	Wire Rod Mill	Coupled		Taunton New Bedf'd Copper Co.	New Bedford, Mass.	AC
27	350	490	2200	25 cy.	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
28	350	490	2200	25 cy.	Brass Mill	Geared	1920	American Brass Co.	Buffalo, N. Y.	W
29	400	350	440	60 cy.	9″ Copper (Fin.) Mill	Direct	1916	Standard Underground Cable Co.	Perth Amboy, N. J.	W
30	400	352	2200	60 cy.	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
31	400	360	2200	60 cy.	Brass Mill	Geared	1917	American Brass Co.	Waterbury, Conn.	GE
32	400	360	2200	60 cy.	Brass Mill	Geared	1917	American Brass Co.	Waterbury, Conn.	GE
33	400	360	2200	60 cy.	Brass Mill	Geared	1921	American Brass Co.	Torrington, Conn.	GE
34	400	360	2200	60 cy.	Brass Mill	Geared	1921	American Brass Co.	Torrington, Conn.	GE
35	400	435	2200	60 cy.	Aluminum Mill	Geared	1918	U. S. Aluminum Co.	New Kensington, Pa.	W
36	400	435	2200	60 cy.	Aluminum Mill	Geared	1918	U. S. Aluminum Co.	New Kensington, Pa.	W
37	400	435	2200	60 cy.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Edgewater, N. J.	W
38	400	440	2200	60 cy.	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
39	400	450	2200	60 cy.	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
40	400	450	440	60 cy.	Brass Sheet Mill	Geared	1920	Detroit Copper & Brass Co.	Detroit, Mich.	GE
41	400	450	440	60 cy.	Sheet Mill	Geared	1924	New Jersey Zinc Co.	Palmerton, Pa.	GE
42	400	450	440	60 cy.	Sheet Mill	Geared	1924	New Jersey Zinc Co.	Palmerton, Pa.	GE
43	400	514	2200	60 cy.	Brass Tubes	Geared	1915	American Brass Co.	Waterbury, Conn.	GE
44	400	514	2200	60 cy.	Brass Tubes	Geared	1915	American Brass Co.	Waterbury, Conn.	GE
45	400	514	440	60 cy.	16″ Copper Bar Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
46	400	514	2200	60 cy.	Brass Mill	Geared	1922	Western Cartridge Co.	East Alton, Ill.	GE
47	400	514	2200	60 cy.	20″ Flat Mill	Geared		American Brass Company	Kenosha, Wis.	AC
48	400	514	2200	50 cy.	24″ Roughing Mill	Geared		American Brass Company	Kenosha, Wis.	AC
49	400	514	2200	50 cy.	18″ Bar Mill	Geared		American Brass Company	Kenosha, Wis.	AC
50	400	575	440	50 cy.	Sheet Copper Rolling Mill	Geared	1923	American Metal Products Co.	Milwaukee, Wis.	W
51	400	600	440	50 cy.	Brass Mill	Geared	1917	Rome Brass & Copper Co.	Rome, N. Y.	GE
52	400	600	2200	50 cy.	Brass Mill	Geared	1921	American Brass Co.	Torrington, Conn.	GE
53	400	600	2200	60 cy.	Zinc Mill	Geared	1922	Ball Bros. Glass Co.	Muncie, Ind.	GE
54	400	720	2200	50 cy.	Copper Mill	Geared	1920	Rome Wire Co.	Rome, N. Y.	GE
55	400	720	550	60 cy.	Copper Mill	Geared	1920	Phillips Wire Co.	Pawtucket, R. I.	GE
56	400	900	550	50 cy.	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
57	400	900	550	60 cy.	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
58	400	900	550	60 cy.	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
59	400	900	550	60 cy.	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
60	400	900	550	60 cy.	Brass Mill	Geared	1921	American Brass Company	Ansonia, Conn.	GE
61	450	200–400	230	d.c.	Zinc Sheet Mill 26″ x 72″	Geared	1924	Illinois Zinc Co.	Peru, Illinois	W
62	450	500	440	50 cy.	Brass Mill	Geared	1918	Michigan Copper & Brass Co.	Detroit, Mich.	W
63	450	550–750		l.c.	Zinc Rolls	Coupled	1924	Matthiesen Hegeler Zinc Co.	LaSalle, Ill.	CW
64	450	600	550	50 cy.	Copper Rod Mill	Geared	1920	Phillips Wire Co.	Pawtucket, R. I.	GE
65	450	870	440	50 cy.	Copper Clad Mill	Geared	1915	Duplex Metal Co.	Philadelphia, Pa.	W
66	500	0–200	500	d.c.	78″ Rev. Brass Plate Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
67	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
68	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
69	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
70	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
71	500	220–400	500	d.c.	Brass Mill	Geared	1913	Scoville Manufacturing Co.	Waterbury, Conn.	W
72	500	290	2200	25 cy.	Brass Mill	Geared	1920	American Brass Company	Buffalo, N. Y.	W
73	500	360	2200	50 cy.	Tube Mill	Geared	1915	American Brass Company	Waterbury, Conn.	GE
74	500	360	2200	50 cy.	Copper Mill	Geared	1917	Anaconda Copper Mining Co.	Black Eagle, Mont.	GE
75	500	360	440	50 cy.	Brass Mill	Direct	1923	Rome Brass & Copper Co.	Rome, N. Y.	GE
76	500	360	440	50 cy.	Brass Mill	Direct	1923	Rome Brass & Copper Co.	Rome, N. Y.	GE
77	500	365	440	25 cy.	Copper Rolling Mill	Rope	1922	Baltimore Cop. Smelt. & Roll. Co.	Baltimore, Md.	W
78	500	368	2200	25 cy.	Brass Mill	Geared	1920	American Brass Company	Buffalo, N. Y.	W
79	500	440	2200	50 cy.	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
80	500	450	2200	50 cy.	Brass Mill	Geared	1915	Scoville Manufacturing Co.	Waterbury, Conn.	GE
81	500	450	2200	60 cy.	Brass Mill	Geared	1915	Scoville Manufacturing Co.	Waterbury, Conn.	GE
82	500	450	2200	60 cy.	Brass Mill	Geared	1915	Scoville Manufacturing Co.	Waterbury, Conn.	GE
83	500	450	2200	60 cy.	Brass Mill	Geared	1915	Chase Metal Works	Waterbury, Conn.	GE
84	500	450	440	60 cy.	20″ Copper Mill	Geared	1916	Waclark Wire Co.	Elizabeth, N. J.	GE
85	500	450	2200	60 cy.	Copper Mill	Geared	1917	Anaconda Copper Mining Co.	Black Eagle, Mont.	GE
86	500	450	2200	60 cy.	Copper Mill	Geared	1917	Anaconda Copper Mining Co.	Black Eagle, Mont.	GE
87	500	450	2200	60 cy.	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
88	500	450	2200	60 cy.	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
89	500	450	440	60 cy.	Brass Sheet Mill	Geared	1920	Detroit Copper & Brass Co.	Detroit, Mich.	GE
90	500	450	2200	60 cy.	Brass Mill	Geared	1921	American Brass Company	Torrington, Conn.	GE
91	300	450	2200	60 cy.	Brass Mill	Geared	1921	American Brass Company	Torrington, Conn.	GE
92	500	450	2200	60 cy.	14″ Roughing Mill	Geared		International Nickel Co.	Huntington, W. Va.	AC
93	500	450	2200	60 cy.	9″ Finishing Mill	Geared		International Nickel Co.	Huntington, W. Va.	AC
94	500	450		50	20″ Copper Mill	Coupled	1918	Waclark Wire Company	Bayway, N. J.	CW
95	500	514	550	60 cy.	18″ Copper Mill	Geared	1919	National Conduit and Cable Co.	Hastings, N. Y.	GE
96	500	514	2200	60 cy.	Brass Mill	Geared	1922	Western Cartridge Co.	East Alton, Ill.	GE
97	500	575	2200	60 cy.	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
98	500	600	2200	60 cy.	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
99	500	600	2200	60 cy.	Brass Mill	Geared	1917	American Brass Company	Waterbury, Conn.	GE
100	500	600	2200	60 cy.	Brass Mill	Geared	1917	American Brass Company	Torrington, Conn.	GE
101	500	600	2200	60 cy.	Copper Rod Mill	Geared	1922	E. F. Phillips Electrical Works, Ltd.	Montreal, Que.	W
102	500	600	2200	50 cy.	Copper Rolling Mill	Geared	1923	American Brass Company	Torrington, Conn.	GE
103	600	300	440	25 cy.	Tandem Plate Mill	Rope		Baltimore Copper S. & R. Co.	Baltimore, Md.	AC
104	600	300	440	25 cy.	Tandem Plate Mill	Rope		Baltimore Copper S. & R. Co.	Baltimore, Md.	AC
105	600	360–400	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
106	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
107	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
108	600	360	440	50 cy.	Copper Mills	Geared	1923	Am. Insulated Wire & Cable Co.	Chicago, Ill.	GE
109	600	450	2200	50 cy.	Aluminum Strip Mill	Geared	1914	Cleveland Metal Products Co.	Cleveland, Ohio	GE
110	600	500	575	25 cy.	Brass Sheet Mill	Geared	1920	Baltimore Tube Co.	Baltimore, Md.	GE
111	600	500	575	25 cy.	Brass Sheet Mill	Geared	1920	Baltimore Tube Co.	Baltimore, Md.	GE
112	600	514	2200	60 cy.	Brass Mill	Geared	1922	Western Cartridge Co.	East Alton, Ill.	GE
113	600	600	4000	60 cy.	Brass Mill	Geared	1919	Bristol Brass Co.	Bristol, Conn.	GE
114	600	600	2200	50 cy.	Copper Mill	Geared	1920	American Brass Co.	Waterbury, Conn.	GE
115	600	600	2200	60 cy.	Brass Mill	Geared	1921	American Brass Company	Waterbury, Conn.	GE
116	600	900	440	60 cy.	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
117	600	900	550	50 cy.	Brass Mill	Geared	1920	American Brass Company	Ansonia, Conn.	GE
118	600	900	440	50 cy.	Copper Mill	Geared	1923	Am. Insulated Wire & Cable Co.	Chicago, Ill.	GE
119	700	360	440	60 cy.	Brass Mill	Chain		Detroit Copper & Brass Co.	Detroit, Mich.	AC
120	700	585	2200	50 cy.	Copper Rod Mill	Geared	1923	Eugene F. Phillips Elec. Works, Ltd.	Montreal, Que.	W
121	700	735	440	25 cy.	Copper Rolling Mill	Geared	1924	Baltimore Cop. Smelt. & Roll. Co.	Baltimore, Md.	W
122	700	735	440	25 cy.	Copper Rolling Mill	Geared	1924	Baltimore Cop. Smelt. & Roll. Co.	Baltimore, Md.	W
123	700	735	440	25 cy.	Copper Rolling Mill	Geared	1924	Baltimore Cop. Smelt. & Roll. Co.	Baltimore, Md.	W
124	750	353	4600	60 cy.	Brass Mill	Geared	1924	Scoville Manufacturing Co.	Waterbury, Conn.	W

ALUMINUM, BRASS, COPPER AND NON-FERROUS MILL DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
125	750	514	550	60 cy.	10" and 9" Copper Mills	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
126	750	514	550	60 cy.	10" and 9" Copper Mills	Geared	1919	National Conduit & Cable Co.	Hastings, N. Y.	GE
127	750	600	4000	60 cy.	Brass Mill	Geared	1919	Bristol Brass Co.	Bristol, Conn.	GE
128	750	720	2200	60 cy.	Zinc Rolling Mill	Geared	1923	American Zinc Products Co.	Greencastle, Ind.	GE
129	800	350	2200	60 cy.	Aluminum Mill	Geared	1915	U. S. Aluminum Co.	Edgewater, N. J.	W
130	800	353	440	50 cy.	8" Copper Rod Mill	Direct	1923	Standard Underground Cable Co.	St. Louis, Mo.	W
131	800	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
132	800	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
133	800	370	650	d.c.	Aluminum Mill	Direct	1917	U. S. Aluminum Co.	Niagara Falls, N. Y.	W
134	800	370–400	650	d.c.	Aluminum Mill	Direct	1919	U. S. Aluminum Co.	Niagara Falls, N. Y.	W
135	800	443	2200	60 cy.	Roughing Mill	Coupled		International Nickel Co.	Huntington, W. Va.	AC
136	800	450	2200	60 cy.	14" Merchant Mill	Geared		International Nickel Co.	Huntington, W. Va.	AC
137	800	870	2200	60 cy.	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
138	800	870	3200	60 cy.	Copper Rod Mill	Geared	1923	American Brass Company	Kenosha, Wis.	W
139	800	900	440	60 cy.	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
140	900	900	440	60 cy.	Copper Rod Mill	Geared	1920	Western Electric Co.	Hawthorne, Ill.	GE
141	1000	300	2200	25 cy.	Aluminum Rod Mill	Geared	1922	U. S. Aluminum Co.	Massena, N. Y.	GE
142	1000	450	2200	60 cy.	20" Merchant Mill	Geared		International Nickel Co.	Huntington, W. Va.	AC
143	1200	360	2200	60 cy.	24" Bar Mill	Geared		International Nickel Co.	Huntington, W. Va.	AC
144	1200	360	2200	60 cy.	30" Sheet Mill	Geared		International Nickel Co.	Huntington, W. Va.	AC
145	1200	400	650	d.c.	Aluminum Plate Mill	Geared	1915	Aluminum Company of America	Niagara Falls, N. Y.	GE
146	1350	600	2300	60 cy.	Copper Mill	Geared	1918	American Brass Company	Waterbury, Conn.	GE

REVERSING MILL DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	350	275–470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Company	Buffalo, N. Y.	GE
2	350	275–470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Company	Buffalo, N. Y.	GE
3	350	275–470	375	d.c.	Reversing Copper Mill	Geared	1920	American Brass Company	Kenosha, Wis.	GE
4	350	275–470	375	d.c.	Reversing Copper Mill	Geared	1922	Taunton-New Bedford Copper Co.	Taunton, Mass.	GE
5	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
6	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
7	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
8	400	20		d.c.	32 x 48 Plate Mill	Coupled	1910	American Sheet & Tin Plate Co.	Gary, Ind.	CW
9	500	–200	500	d.c.	78" Rev. Brass Plate Mill	Geared	1920	West Virginia Metal Products Co.	Fairmont, W. Va.	W
10	700	86	450	d.c.	Shear Intensifier	Direct	1918	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
11	800	37–70	500	d.c.	Plate Mill	Coupled		Universal Rolling Mill Co.	Bridgeville, Pa.	AC
12	1000	50–100	600	d.c.	24" Billet (Roughing)	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	W
13	1000	50–175	600	d.c.	24" Mill	Direct	1916	Central Steel Co.	Massillon, Ohio	W
14	1750	70–120	600	d.c.	20" Billet Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
15	1800	–40	600	d.c.	84" Rev. Shrd. Plate Mill	Direct	1919	Youngstown Sheet & Tube Co.	Youngstown, Ohio	W
16	2000	50–100	600	d.c.	30" Bar Mill	Direct	1919	Follansbee Brothers Co.	Toronto, O.	W
17	2100	50–125	700	d.c.	42" Universal Plate Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
18	2100	47–120	700	d.c.	34" Blooming Mill	Direct	1916	Penn Seaboard Steel Corporation	New Castle, Del.	W
19	2200	50–120	600	d.c.	40" Universal Plate Mill	Direct	1919	Dominion Foundrya & Steel Co.	Hamilton, Ont.	W
20	2200	70–150	600	d.c.	28" Blooming Mill	Direct	1920	Atlantic Steel Co.	Atlanta, Ga.	W
21	2900	47–120	700	d.c.	34" Blooming Mill	Direct	1917	Sharon Steel Hoop Co.	Youngstown, Ohio	W
22	3200	50–120	700	d.c.	34" Struct. (Rough.) Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
23	3200	50–120	700	d.c.	28" Struct. (Fin.) Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
24	3250	50–120	500	d.c.	36" Blooming Mill	Direct	1916	Am. Rolling Mill Co.	Ashland, Ky.	GE
25	3250	50–120	500	d.c.	34" Blooming Mill	Direct	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
26	3500	70–100	525	d.c.	32" Blooming Mill	Direct	1913	Steel Company of Canada	Hamilton, Ont.	W
27	3500	50– 75	700	d.c.	34" Blooming Mill	Direct	1914	Central Steel Co.	Massillon, Ohio	W
28	3500	50–120	700	d.c.	35" Roughing Struct. Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	W
29	3600	40– 90	600	d.c.	35" Blooming Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	W
30	3600	40– 90	600	d.c.	40" Blooming Mill	Direct	1917	Illinois Steel Co.	Gary, Ind.	W
31	4000	0–150	575	d.c.	36" Univ. Plate Mill	Direct	1905	Illinois Steel Co.	South Chicago, Ill.	W
32	4000	50–120	700	d.c.	34" Blooming Mill	Direct	1924	Donner Steel Co.	Buffalo, N. Y.	GE
33	4000	80–135	650	d.c.	30" Univ. Skelp Mill	Direct	1922	Youngstown Sheet & Tube Co.	Youngstown, Ohio	GE
34	4000	0– 80	1200	d.c.	34" Blooming Mill	Coupled		Algoma Steel Co.	Sault Ste. Marie,Can.	AC
35	5000	40–120	600	d.c.	40" Blooming Mill	Direct	1916	National Tube Co.	Lorain, Ohio	W
36	5000	40–120	600	d.c.	35" Blooming Mill	Direct	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
37	5000	40–120	600	d.c.	35" Blooming Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
38	5000	50–120	700	d.c.	36" Rev. Roughing Struct.	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
39	5000	75–100	700	d.c.	48" Universal Plate Mill	Direct	1923	Bethlehem Steel Co.	Lackawanna, N. Y.	W
40	5000	75–150	700	d.c.	28" Fin. Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	W
41	6000	40–120	600	d.c.	44" Blooming Mill	Direct	1919	Bethlehem Steel Co.	Steelton, Pa.	W
42	6500	40–120	600	d.c.	40" Blooming Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
43	6500	50–120	600	d.c.	36" Blooming Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
44	6500	50–120	600	d.c.	40" Blooming Mill	Direct	1916	Bethlehem Steel Co.	Sparrows Point, Md.	GE
45	6500	50–120	600	d.c.	40" Blooming Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
46	7000	50–120	700	d.c.	40" Rev. Blooming Mill	Direct	1923	Bethlehem Steel Co.	Lackawanna, N. Y.	W
47	7000	50–120	700	d.c.	44" Blooming Mill	Direct	1924	Carnegie Steel Co.	Homestead, Pa.	W
48	7000	50–120	700	d.c.	40" Blooming Mill	Direct	1924	International Harvester Co. Wisconsin Steel Works	Chicago, Ill.	W
49	7000	55–120	900	d.c.	45" Blooming Mill	Direct	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
50	7000	50–100	700	d.c.	60" Universal Plate Mill	Direct	1919	Bethlehem Steel Co.	Sparrows Point, Md.	W
51	8000	150	600	d.c.	28" Rail Mill	Direct	1917	Bethlehem Steel Co.	Lackawanna, N. Y.	GE

A. C. SPEED SETS

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300–300	187.5–112.5	2200	25 cy.	12" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
2	300–300	187.5–112.5	2200	25 cy.	12" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
3	300–300	300–180	2200		10" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
4	300–225–165	335–225–165	6600		12" Hot Strip Mill	Geared	1920	Illinois Steel Co.	Gary, Ind.	GE
5	300–300	500–300	2200		9" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
6	300–300	500–300	2200		8" Merchant Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
7	300–150	590–292	2200	60 cy.	9" Merchant Mill	Geared	1920	Cleveland Hardware Co.	Cleveland, Ohio	W
8	350–235	300–200	6600		Merchant Mill	Geared	1920	Illinois Steel Co.	Gary, Ind.	GE

A. C. SPEED SETS—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
9	350–350	360–240	440	60 cy.	Bar Mill	Coupled		Simmons Mfg. Co.	Kenosha, Wis.	AC
10	400–400	107– 64	2200		16″ Bar Mill	Direct	1914	Bethlehem Steel Co.	Lebanon, Pa.	GE
11	400	720–450	2200	60 cy.	Bar Mill	Geared		Cyclops Steel Co.	Titusville, Pa.	AC
12	450	352–230	2200	60 cy.	8″ Merchant Mill	Direct	1919	Bourne-Fuller Co.	Cleveland, Ohio	W
13	450–360	440–350	2200	60 cy.	Cont. Hoop (Fin.) Mill	Direct	1920	Connors Steel Co.	Birmingham, Ala.	W
14	450–380	700–595	2200	60 cy.	Cont. Hoop (Fin.) Mill	Direct	1920	Connors Steel Co.	Birmingham, Ala.	W
15	450	730–490	4000	25 cy.	10″ Merchant Mill	Geared	1917	Atlas Steel Corporation	Dunkirk, N. Y.	W
16	500–385–250	130–100–65	440		14″ Merchant Mill	Direct	1923	Halcomb Steel Co.	Syracuse, N. Y.	GE
17	500–500	327–200	440		9″ Merchant Mill	Direct	1913	Bourne Fuller Co.	Cleveland, Ohio	GE
18	500–500–500	500–375–265	2200		10″ Merchant Mill	Direct & Belt	1916	Donner Steel Co.	Buffalo, N. Y.	GE
19	500	575–865	2200	60 cy.	10″ Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	W
20	500	575–865	2200	60 cy.	10″ Merchant Mill	Geared	1921	International Nickel Co.	Huntington, W. Va.	W
21	{500 / 250	880–514 / 440–256}	2200	60 cy.	10″ Merchant Mill	Geared	1919	Hunter Crucible Steel Co.	Cleveland, Ohio	W
22	500	888–540	6600	60 cy.	11″ Finishing Stand	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
23	550	320–206	2200	60 cy.	10″ Hoop Mill	Direct	1917	Atlantic Steel Co.	Atlanta, Ga.	W
24	600–525	250–125	2200		16″ & 15″ Merchant Mill	Direct & Rope	1913	Bethlehem Steel Co.	Steelton, Pa.	GE
25	600–600	300–214	2200	25 cy.	Bar Mill	Coupled & Rope		St. Louis Screw Co.	St. Louis, Mo.	W
26	600	300–214	2200	25 cy.	Bar Mill	Chain		St. Louis Screw Co.	St. Louis, Mo.	W
27	600–400–200	321–214–107	440		9″ Merchant Mill	Direct	1923	Halcomb Steel Co.	Syracuse, N. Y.	GE
28	600–400	375–210	2200		9″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
29	600–600–600	469–375–281	2200		8″ Merchant Mill	Direct	1919	Donner Steel Co.	Buffalo, N. Y.	GE
30	600	585–325	500	40 cy.	16″ Merchant Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
31	600–500–400	600–500–400	2200		Merchant Mill, No. 19	Direct	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
32	600–600	720–360	6600	60 cy.	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
33	700–600–400	400–300–200	2200		Merchant Mill, No. 10	Direct	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
34	700–600–400	400–300–200	2200		Merchant Mill, No. 10	Belt	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
35	700	485–290	2200	25 cy.	12″ Merchant Mill	Geared	1916	Halcomb Steel Co.	Syracuse, N. Y.	W
36	700	730–490	4000	25 cy.	14″ Merchant Mill	Geared	1916	Atlas Steel Corporation	Dunkirk, N. Y.	W
37	700	880–530	2200	60 cy.	10″ Finishing Mill	Geared	1923	Crucible Steel Co. of America, Park Works	Pittsburgh, Pa.	W
38	750–750	225–168	440	60 cy.	Bar Mill	Coupled		Simmons Mfg. Co.	Kenosha, Wis.	AC
39	750–625–460	360–300–220	6600		12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
40	750–600–440	473–375–278	6600		12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
41	800	225–150	2200	25 cy.	12″ Bar Mill	Direct	1919	Scullin Steel Co.	St. Louis, Mo.	W
42	800	590–292	6600	60 cy.	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
43	800–400	600–300	550		Bar Mill	Geared	1916	Ludlum Steel Co.	Watervliet, N. Y.	GE
44	800–800–800	720–600–480	2200		12″ Hot Strip	Geared	1920	Canadian Electric Steel Co.	Montreal, Canada	GE
45	800	730–365	2200	50 cy.	22″ Bar Mill	Geared	1916	Columbia Steel Co.	Los Angeles, Cal.	W
46	800	730–365	2200	50 cy.	12″ Merchant Mil	Geared	1916	Columbia Steel Co.	Los Angeles, Cal.	W
47	800	880–490	2200	60 cy.	16″ Bar Mill	Geared	1920	Knoxville Iron Co.	Knoxville, Tenn.	W
48	800	880–623	2200	60 cy.	20″ Mer. (Roughing) Mill	Geared	1918	Hoosier Rolling Mill Co.	Terre Haute, Ind.	W
49	850–570	214–143	6600		Merchant Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
50	900–710–620	325–257–182	2300		10″ Hoop Mill	Geared	1918	Acme Steel Goods Co.	Riverdale, Ill.	GE
51	1000	209–150	6400	25 cy.	24″ Flat (Fin.) Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	W
52	1000	292–150	2200	60 cy.	12″ Merchant Mill	Direct	1918	Central Steel Co.	Massillon, Ohio	W
53	1000	590–450	4000	60 cy.	14″ Merchant Mill	Geared	1920	Calumet Steel Co.	Chicago, Ill.	W
54	1000	590–450	4000	60 cy.	14″ Merchant Mill	Geared	1920	Calumet Steel Co.	Chicago, Ill.	W
55	1000	590–495	6600	60 cy.	24″ Structural Mill	Geared	1917	Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	W
56	1100	294–295	2200	60 cy.	20″ Merchant Mill	Rope	1912	United Alloy Steel Corporation	Canton, Ohio	W
57	1180–955–705	560–450–336	2200		Rod Mill	Belt	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
58	1200–1150–800	300–214–150	2200		Merchant Mill, No. 10	Geared	1916	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
59	1200–1000–800	300–250–200	4400		14″ Merchant Mill	Direct	1919	Buffalo Bolt Co.	N. Tonawanda, N. Y.	GE
60	1200–1000–800	450–375–300	6600		8″ Hoop Mill, No. 9	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
61	1200–1000–800	450–375–300	6600		8″ Bar Mill, No. 16	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
62	1200–1200–1200	450–360–270	2300		9″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
63	1200–1200–1200	450–360–270	2300		9″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
64	1200–1200–1200	450–360–270	2300		9″ Hot Strip Mill	Direct	1916	Trumbull Steel Co.	Warren, Ohio	GE
65	1200–1000–800	450–375–300	6600		8″ Hoop Mill, No. 8	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
66	1200–1000–800	450–375–300	6600		18″ Band Mill, No. 13	Geared	1919	Carnegie Steel Co.	Youngstown, Ohio	GE
67	1200	505–303	6600	60 cy.	16″ Hoop and Band Mill	Geared	1919	Weirton Steel Co.	Weirton, W. Va.	W
68	1200	590–441	2200	60 cy.	16″ Duo & Bull Head Mill	Geared	1916	Central Steel Co.	Massillon, Ohio	W
69	1200	590–407	2200	60 cy.	20″ Merchant (Fin.) Mill	Geared	1918	Hoosier Rolling Mill Co.	Terre Haute, Ind.	W
70	1250–1000–650	650–500–325	2200		Rod Mill	Belt	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
71	1250	712–430	6600	60 cy.	3 Stand 12″ Mill	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
72	1300–900	214–140	2200		12″ Merchant Mill	Direct	1912	Forged Steel Wheel Co.	Butler, Pa.	GE
73	1400–1400	600–405	2200		21″ Merchant Mill	Geared	1915	Union Rolling Mills Co.	Cleveland, Ohio	GE
74	1500	133–81.5	6600	25 cy.	18″ Structural Mill	Direct	1915	Bethlehem Steel Co.	Bethlehem, Pa.	W
76	1500	210–140	6600	25 cy.	18″ Bar Mill	Geared	1916	Carnegie Steel Co.	Duquesne, Pa.	W
76	1500–1250–1000	360–300–240	2200		28″ Rail Mill	Geared	1920	Bethlehem Steel Co.	Steelton, Pa.	GE
77	1500	365–244	6600	25 cy.	12″ Bar Mill	Rope	1916	Carnegie Steel Co.	Duquesne, Pa.	W
78	1500–1125	375–281	2200		10″ Merchant Mill	Geared	1916	Donner Steel Co.	Buffalo, N. Y.	GE
79	1500–1500	450–360	2300		16″ Hot Strip Mill	Geared	1916	Trumbull Steel Co.	Warren, Ohio	GE
80	1500–1500	514–237	6600	60 cy.	Hot Strip Mill	Geared		Weirton Steel Co.	Weirton, W. Va.	AC
81	1500	514–257	6600	60 cy.		Coupled	1924	Weirton Steel Co.	Weirton, W. Va.	AC
82	1500	890–540	6600	60 cy.	4 Stand 12″ Mill	Coupled		Tennessee Coal, Iron & R. R. Co.	Birmingham, Ala.	AC
83	1650–1500–1350	413–375–337	6600		10″ Bar Mill, No. 10	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
84	1800–1500–1200	240–200–160	2300		10″ Hoop Mill	Belt	1918	Acme Steel Goods Co.	Riverdale, Ill.	GE
85	1800–1800–1800	370–300–247	6600		Sheet Bar Mill	Geared	1920	American Rolling Mill Co.	Ashland, Ky.	GE
86	1800–1500–1200	450–375–300	6600		10″ Hoop Mill, No. 11	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
87	1850–1450– 925	120– 94– 60	6600		16″ Hand Bar Mill	Direct	1921	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
88	2000–2000–2000	100–83.3–65	6600		12″ Structural Mill	Direct	1916	Bethlehem Steel Co.	Bethlehem, Pa.	GE
89	2000	234–161	2200	60 cy.	10″ Skelp (Fin.) Mill	Belted	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
90	2000–2000	250–161	6600		10″ Skelp Mill	Geared	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
91	2000	250–150	2200	60 cy.	Morgan Continuous Mill	Coupled		Interstate Iron & Steel Co.	Chicago, Ill.	AC
92	2000	350–234	2200	60 cy.	10″ Skelp (Rough.) Mill	Geared	1916	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
93	2000–2000–1600	450–360–270	2200		16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
94	2000–2000–1600	450–360–270	2200		16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
95	2000–2000–1600	450–360–270	2200		16″ Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
96	2070–1650–1205	235–187.5–137	6600		20″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
97	2200–2000–1800	275–250–225	6600		10″ Bar Mill, No. 15	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
98	2200	505–303	2200	60 cy.	18″ Bar Mill	Geared	1919	Central Steel Co.	Massillon, Ohio	W
99	2300–1300	115.4–65	6600		10″ Skelp Mill	Geared	1915	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
100	2360–1880–1440	410–327–250	2200		Rod Mill	Geared	1916	Keystone Steel & Wire Co.	Peoria, Ill.	GE
101	2470–1725–1235	430–300–215	2200		Rod Mill	Geared	1916	Wickwire Spencer Steel Co.	Buffalo, N. Y.	GE
102	2500	354–177	6600	60 cy.	16″ Hoop and Band Mill	Geared	1915	Weirton Steel Co.	Weirton, W. Va.	W
103	2750–2240–1750	262–214–167	6600		12″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE
104	2750–2500–2250	275–250–225	6600		14″ Bar Mill, No. 14	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
105	3000–3000–3000	155–144–130	6600		24″ Structural Mill	Direct	1917	Tennessee Coal, Iron & R. R. Co.	Fairfield, Ala.	GE
106	3000–2500–2000	300–250–200	6600		18″ Band Mill, No. 13	Direct	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
107	3000–2500–2000	300–250–200	6600		12″ Hoop Mill, No. 12	Geared	1916	Carnegie Steel Co.	Youngstown, Ohio	GE
108	3000	354–212	2200	60 cy.	24″ Skelp Mill	Geared	1920	Youngstown Sheet & Tube Co.	Indiana Harbor, Ind.	W
109	3000	505–300	2200	60 cy.	12″ Merchant Mill	Geared	1920	United Alloy Steel Corporation	Canton, Ohio	W
110	4500–4500	500–300	2200		14″ Merchant Mill	Geared	1923	Inland Steel Co.	Indiana Harbor, Ind.	GE
111	5500–4400–3400	170–136–105	6600		20″ Hot Strip Mill	Direct	1920	Illinois Steel Co.	Gary, Ind.	GE

DIRECT CURRENT ADJUSTABLE SPEED DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd By
1	200–300	360–920	230		Merchant Mill	Direct	1919	Bethlehem Steel Co.	Lackawanna, N. Y.	GE
2	300	300–400	230	d.c.	Cold Rolling Mill	Geared	1914	Trumbull Steel Co.	Warren, Ohio	W
3	300	300–600	230	d.c.	20" x 30" Brass Mill	Geared	1920	W. Va. Metal Products Co.	Fairmont, W. Va.	W
4	300	300–600	230	d.c.	20" x 30" Brass Mill	Geared	1920	W. Va. Metal Products Co.	Fairmont, W. Va.	W
5	300	300–600	230	d.c.	22" x 36" Brass Mill	Geared	1920	W. Va. Metal Products Co.	Fairmont, W. Va.	W
6	300	300–600	230	d.c.	22" x 36" Brass Mill	Geared	1920	W. Va. Metal Products Co.	Fairmont, W. Va.	W
7	300	300–400	230	d.c.	Cold Rolling	Geared	1920	Alan Wood, Iron & Steel Co.	Conshohocken, Pa	W
8	300	315–630	230		8" Merchant Mill	Direct	1919	Donner Steel Co.	Buffalo, N. Y.	GE
9	300	325–650	220	d.c.				Aluminum Company of America	New Kensington, Pa.	AC
10	300	345–500	500	d.c.	Tube Rolling Mill	Geared	1912	Pittsburgh Steel Products Co.	Monessen, Pa.	W
11	300	350–450	230	d.c.	Merchant Bar Mill	Geared	1916	Carbon Steel Co.	Pittsburgh, Pa.	W
12	300	350–450	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
13	300	400–800	230		Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
14	300	400–800	230		Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
15	300	400–800	230		Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
16	300	400–800	230		Cold Strip Mill	Geared	1913	Weirton Steel Co.	Weirton, W. Va.	GE
17	300	400–800	230		20" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
18	300	400–800	230		20" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
19	300	400–800	230		20" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
20	300	400–800	230		20" Cold Strip Mill	Geared	1919	Trumbull Steel Co.	Warren, Ohio	GE
21	300	450–750	230	d.c.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
22	300	450–750	230	d.c.	Wheel Mill	Geared		Bethlehem Steel Co.	Johnstown, Pa.	AC
23	350	200–300	250	d.c.	9" Merchant Mill	Direct	1919	Natl. Farming Machinery, Ltd.	Montmagny, P. Q.	W
24	350	240–360	240		10" Merchant Mill	Direct	1911	LaClede Steel Co.	St. Louis, Mo.	GE
25	350	240–480	240		10" Merchant Mill	Direct	1923	LaClede Steel Co.	St. Louis, Mo.	GE
26	350	250–325	230	d.c.	9" Merchant Mill	Direct	1921	Wayne Steel Company	Erie, Pa.	W
27	350	300–425	230	d.c.	8" Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
28	350	360–450	230		Welding Rolls	Direct	1920	National Tube Company	Lorain, Ohio	GE
29	350	360–450	230		Welding Rolls	Direct	1920	National Tube Company	Lorain, Ohio	GE
30	350	500	230	d.c.	16" Cont. Skelp Mill	Geared	1924	Gary Tube Co.	Gary, Ind.	AC
31	350	524–850	230	d.c.	18" Blading Mill	Geared	1924	W. E. & M. Co.	South Phila. Works	W
32	360	300–600	230	d.c.	Rod Mill	Direct	1922	United Alloy Steel Corporation	Canton, Ohio	W
33	360	350–500	230	d.c.	7" Rod Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
34	375	430–860	230	d.c.	20" Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
35	375	430–860	230	d.c.	20" Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
36	375	430–860	230	d.c.	20" Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
37	375	430–860	230	d.c.	20" Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
38	375	430–860	230	d.c.	20" Cold Rolling Mill	Geared	1922	Otis Steel Company	Cleveland, Ohio	W
39	400	200–300	230	d.c.	9" Merchant Mill	Direct	1914	United Alloy Steel Corporation	Canton, Ohio	W
40	400	250–500	230		10" Merchant Mill	Direct	1920	Timken Roller Bearing Co.	Canton, Ohio	GE
41	400	275–500	550		12" Hot Strip Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	GE
42	400	400–450	220	d.c.	8" Merchant Mill	Direct	1911	Illinois Steel Co.	Milwaukee, Wis.	W
43	450	200–400	230	d.c.	26" x 72" Sheet Zinc Mill	Geared	1924	Illinois Zinc Co.	Peru, Illinois	W
44	400–500	300–600	600	d.c.	9" Merchant—Fin. Mill	Geared	1921	Driver Harris Co.	Harrison, N. J.	W
45	450	400–650	230	d.c.	Rod (1 Stand) No. 2	Direct	1913	American Steel & Wire Co.	Worcester, Mass.	W
46	450	450–600	230	d.c.	12" Cold Rolls (2 Tandem Stands Roughing)	Geared	1915	Superior Steel Co.	Carnegie, Pa.	W
47	450	450–600	230	d.c.	12" Cold Rolls (2 Tandem Stands Roughing)	Geared	1915	Superior Steel Co.	Carnegie, Pa.	W
48	500	150–225	250	d.c.	12" Merchant Mill	Direct	1919	Natl. Farming Machinery, Ltd.	Montmagny, P. Q.	W
49	500	155–500	250	d.c.	Tyre Mill	Direct	1923	McConway Torley Co.	Pittsburgh, Pa.	W
50	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Mfg. Co.	Waterbury, Conn.	W
51	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Mfg. Co.	Waterbury, Conn.	W
52	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Mfg. Co.	Waterbury, Conn.	W
53	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Mfg. Co.	Waterbury, Conn.	W
54	500	220–400	550	d.c.	Brass Mill	Geared	1913	Scoville Mfg. Co.	Waterbury, Conn.	W
55	500	250–325	230		8" Hoop Mill	Direct	1909	Atlantic Steel Co.	Atlanta, Ga.	GE
56	500	250–500	230	d.c.	9" Hoop Mill (Finishing)	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
57	500	250–350	600	d.c.	9" Merchant Mill	Direct	1921	Missouri Rolling Mill Co.	St. Louis, Mo.	W
58	500	300–450	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
59	500	400–600	230		Hoop Mill	Geared	1920	Atlantic Steel Co.	Atlanta, Ga.	GE
60	550	120–300	250	d.c.	10" Merchant Mill	Direct	1923	Firth Sterling Steel Co.	McKeesport, Pa.	W
61	600	150–250	575		6" Hot Strip Mill	Direct	1913	American Steel & Wire Co.	Cleveland, Ohio	GE
62	600	200–300	230	d.c.	9" Merchant Mill	Direct	1914	United Alloy Steel Corporation	Canton, Ohio	W
63	600	200–300	230	d.c.	9" (Finishing Train) Mill	Direct	1915	United Alloy Steel Corporation	Canton, Ohio	W
64	600	225–425	550		12" Hot Strip Mill	Direct	1916	American Steel & Wire Co.	Cleveland, Ohio	GE
65	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
66	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
67	600	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
68	700	135–360	240	d.c.	Merchant Mill	Direct	1923	Atlas Steel Corporation	Dunkirk, N. Y.	W
69	700	300–400	230	d.c.	Lap Welding Mill	Coupled		Gary Tube Co.	Gary, Ind.	AC
70	720–900	160–200	220	d.c.	Wheel Mill	Geared	1906	Bethlehem Steel Co.	Johnstown, Pa.	GE
71	750	120–210	250	d.c.	14" Finishing Mill	Coupled	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
72	750	120–210	250	d.c.	14" Finishing Mill	Coupled	1923	Pittsburgh Crucible Steel Co.	Midland, Pa.	AC
73	750	235–325	230		Piercing Mill	Geared	1914	Pittsburgh Seamless Tube Co.	Beaver Falls, Pa.	GE
74	750	300–600	230	d.c.	Cold Rolling Mill	Geared	1924	International Nickel Co.	Huntington, W. Va.	AC
75	750–750	360–860	600	d.c.	14" Continuous Mill	Geared	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
76	800	200–300	500	d.c.	Piercing Mill	Direct	1912	Pittsburgh Steel Products Co.	Monessen, Pa.	W
77	800	200–300	500	d.c.	Piercing Mill	Rope	1912	Pittsburgh Steel Products Co.	Monessen, Pa.	W
78	800	200–400	600		14" Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
79	800	210–315	575		6" Hot Strip Mill	Direct	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
80	800	231–462	600		14" Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
81	800	250–500	230	d.c.	14" and 9" Hoop Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
82	800	256–512	600		14" Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
83	800	260–390	575		6" Hot Strip Mill	Direct	1907	American Steel & Wire Co.	Cleveland, Ohio	GE
84	800	275–550	600		14" Hot Strip Mill	Direct	1920	Trumbull Steel Co.	Warren, Ohio	GE
85	800	350–700	600	d.c.	20" Merchant Mill (Breakdown)	Geared	1921	Driver Harris Co.	Harrison, N. J.	W
86	800	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
87	800	360–440	500	d.c.	Aluminum Mill	Geared	1919	U. S. Aluminum Co.	Marysville, Tenn.	W
88	800	370–400	650	d.c.	Aluminum Mill	Direct	1917	U. S. Aluminum Co.	Niagara Falls, N. Y.	W
89	800	370–400	650	d.c.	Aluminum Mill	Direct	1919	U. S. Aluminum Co.	Niagara Falls, N. Y.	W
90	800	400–600	600	d.c.	16" Merchant Mill	Geared	1921	Missouri Rolling Mill Co.	St. Louis, Mo.	W
91	800	410–720	230	d.c.	16" Merchant Mill (Rougher)	Geared	1923	Timken Roller Bearing Co.	Canton, Ohio	W
92	800–363	320–706	600		10" Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
93	800–363	320–706	600		10" Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
94	800–363	320–706	600		10" Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
91	975–375	650–250	600	d.c.	Rod (Roughing) Mill	Geared	1922	Atlantic Steel Co.	Atlanta, Ga.	W
92	975–510	865–450	600	d.c.	Rod (Finishing) Mill	Direct & Belted	1922	Atlantic Steel Co.	Atlanta, Ga.	W
93	1000	300–400	230	d.c.	Lap Welding Mill			Gary Tube Co.	Gary, Ind.	AC
94	1000	518–800	250	d.c.	20" Merchant Mill	Geared	1919	Natl. Farming Machinery Ltd.	Montmagny, P. Q.	W
95	1200	150–250	230		12" Merchant Mill	Direct	1920	Timken Roller Bearing Co.	Canton, Ohio	GE
96	1250	175–400	230	d.c.	Rod Mill	Direct	1915	United Alloy Steel Corp.	Canton, Ohio	W
97	1250	175–350	600		14" Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
98	1250	175–350	600		14" Hot Strip Mill	Geared	1920	Trumbull Steel Co.	Warren, Ohio	GE
99	1500	100–125	220	d.c.	Light Rail Mill	Direct	1905	Carnegie Steel Co.	Bessemer, Pa.	W

DIRECT CURRENT ADJUSTABLE SPEED DRIVES—Continued

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
100	1500	100–125	220	d.c.	Light Rail Mill	D rect	1905	Carnegie Steel Co.	Bessemer, Pa.	W
101	1500	125–250	230	d.c.	14″ Band Mill	Direct	1914	Sharon Steel Hoop Co.	Sharon, Pa.	W
102	1500	125–250	240	d.c.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
103	1500	125–250	240	d.c.	Strip Mill	Geared	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
104	1500	150–300	230	d.c.	18-14″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Johnstown, Pa.	AC
105	1500	150–300	230	d.c.	18-13″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Johnstown, Pa.	AC
106	1500	280–420	600		20″ Hot Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
107	1500	280–420	600		20″ Hot Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
108	1500	280–420	600		20″ Hot Strip Mill	Geared	1922	Otis Steel Co.	Cleveland, Ohio	GE
109	1500	470–510	230	d.c.	Rod Mill	Direct	1923	John A. Roebling Sons	New York, N. Y.	W
110	1600	210–420	525	d.c.	Rod Mill	Geared	1913	Steel Co. of Canada	Hamilton, Ont.	W
111	1600	210–420	525	d.c.	Rod Mill	Geared	1913	Steel Co. of Canada	Hamilton, Ont.	W
112	1700	90–140	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
113	1700	90–205	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
114	1750	150–300	230	d.c.	18-14″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	AC
115	1800	115–230	600		20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
116	1800	115–230	600		20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
117	1800	115–230	600		20″ Hot Strip Mill	Direct	1922	Otis Steel Co.	Cleveland, Ohio	GE
118	1800	165–350	240	d.c.	Strip Mill	Direct	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
119	1800	165–350	240	d.c.	Strip Mill	Direct	1922	West Leechburg Steel Co.	Leechburg, Pa.	W
120	1850	575–221	600	d.c.	Rod Mill	Direct & Belted	1922	Atlantic Steel Co.	Atlanta, Ga.	W
121	2000–1700	210–680	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
122	2000	260–800	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
123	2100	150–310	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
124	2100–1600	150–460	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
125	2870–1435	200–400	600		10″ Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
126	3000	150–300	230	d.c.	18-14″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Johnstown, Pa.	AC
127	3000	150–300	230	d.c.	18-13″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Johnstown, Pa.	AC
128	3000	200–360	600		14″ Mill	Direct	1924	Jones & Laughlin Steel Corp.	Woodlawn, Pa.	GE
129	3000	325–485	600	d.c.	24″ Structural Mill	Geared	1923	Phoenix Iron Co.	Phoenixville, Pa.	W
130	3200	50–120	700	d.c.	28″ Structural Mill	Direct	1915	Inland Steel Co.	Indiana Harbor, Ind.	W
131	3500	150–300	230	d.c.	18-14″ Structural Mill	Direct	1924	Bethlehem Steel Corp.	Lackawanna, N. Y.	AC
132	4500	67.5–110	500		14″ Merchant Mill	Direct	1923	Ford Motor Co.	Detroit, Mich	GE

MULTI-SPEED DRIVES

No.	Horse Power	R.P.M.	Voltage	Cycle	Type and Size of Mill	Method of Drive	Date of Purchase	Name of Plant	Location	Mfgd. By
1	300–300–150	600–400–300	440		Bar Mill	Chain	1916	Vulcan Crucible Steel Co.	Aliquippa, Pa.	GE
2	350–350	150–100	6600		12″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
3	350–350	375–214	6600		9″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
4	400–225	600–300	550		Bar Mill	Geared	1909	Ludlum Steel Co.	Watervliet, N. Y.	GE
5	400–265	875–585	2200	60 cy.	Bar Mill	Geared	1913	Old Dominion Iron & Nail Co.	Richmond, Va.	W
6	450–360	870–695	2200	60 cy.	10″ Merchant Mill	Geared	1918	Cleveland Hardware Co.	Cleveland, Ohio	W
7	450–360	875–700	2200	60 cy.	9″ Merchant Mill	Geared	1915	National Lock Washer Co.	Riverside, N. J.	W
8	475–350	240–181	440	25 cy.	10″ Merchant Mill	Direct	1914	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
9	485–360	870–695	2200	60 cy.	10″ Merchant Mill	Geared	1915	Old Dominion Iron & Nail Co.	Richmond, Va.	W
10	500	730–485	2200	50 cy.	8″ Merchant Mill	Geared	1919	Southern Calif. Iron & Steel Co.	Los Angeles, Cal.	W
11	500–250	750–375	3000		Merchant Mill	Geared	1923	Consolidated Rolling Mills	Mexico City, Mex.	GE
12	500–400	775–585	550	40 cy.	10″ Merchant Mill	Geared	1917	Cohoes Rolling Mill Co.	Cohoes, N. Y.	W
13	500–400	875–700	550	60 cy.	10″–14″ Merchant Mill	Geared	1916	The Texas Steel Co.	Fort Worth, Texas	W
14	550–360	875–585	2200	60 cy.	12″ Merchant Mill	Geared	1917	Norfolk & Western Railroad	Roanoke, Va.	W
15	575–575	375–250	6600		8″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
16	575–575	300–214	6600		10″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
17	600–600	214–93	6600		12″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
18	600–400	514–300	2200		Rod Mill	Direct	1912	Oliver Iron & Steel Co.	Pittsburgh, Pa.	GE
19	800–800	214–167	6600		16″ Merchant Mill	Direct	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
20	800–400	600–300	550		Bar Mill	Geared	1917	Ludlum Steel Co.	Watervliet, N. Y.	GE
21	800–363	706–320	600		10″ Rod Mill	Geared	1922	Wheeling Steel Corp.	Portsmouth, Ohio	GE
22	800	730–485	2200	50 cy.	12″ Merchant Mill	Geared	1919	Southern Calif. Iron & Steel Co.	Los Angeles, Cal.	W
23	800–800	900–720	2200		9″ Merchant Mill	Geared	1923	Knoxville Iron Co.	Knoxville, Tenn.	GE
24	800–800	900–720	2200		9″ Merchant Mill	Geared	1923	Knoxville Iron Co.	Knoxville, Tenn.	GE
25	800	875–700	2200	60 cy.	16″ Merchant Mill	Geared	1920	Kansas City Bolt & Nut Co.	Kansas City, Mo.	W
26	850–850	214–187	6600		10″ Merchant Mill	Rope	1916	Illinois Steel Co.	Gary, Ind.	GE
27	850–850	214–187	6600		10″ Merchant Mill	Rope	1916	Illinois Steel Co.	Gary, Ind.	GE
28	900–900	214–150	2200		12″ Merchant Mill	Direct	1910	Algoma Steel Co.	Sault Ste. Marie, Can.	GE
29	1100–1500	91	2200	25 cy.	84″ Plate (Fin.) Mill	Direct	1910	American Sheet & Tin Plate Co.	Gary, Ind.	W
30	1300–1300	214–187	6600		10″ Merchant Mill	Geared	1916	Illinois Steel Co.	Gary, Ind.	GE
31	1800–1800	250–125	6600		22″ Merchant Mill	Geared	1913	Bethlehem Steel Co.	Bethlehem, Pa.	GE
32	2000	163–113	6600	25 cy.	10″ Merchant Mill	Direct	1909	Illinois Steel Co.	Gary, Ind.	W
33	2500	113–91	6600	25 cy.	12″ Merchant Mill	Geared	1909	Illinois Steel Co.	Gary, Ind.	W
34	6500–4500	107–53	6600		60″ 3-High Univ. plate Mill	Direct	1909	Illinois Steel Co.	Gary, Ind.	GE

Papers Presented Before A. I. & S. E. E.

(Classified List)

Electric Reversing Drives

1914 "Electrically Driven Reversing Mills," by Wilfred Sykes.
1916 "Operating Characteristics of an Electric Reversing Blooming Mill," by E. S. Jefferies.
1917 "Electrical Reversing Blooming Mills," by R. D. Nye.
1917 "Electric Drives for Reversing Rolling Mills," by D. M. Petty.
1920 "Steam vs. Electric Driven Mills," by H. E. Seibert, D. E. Eppelshiemer, B. C. Fennell, K. A. Pauly, E. S. Jefferies, G. E. Stoltz, B. R. Shover, Gordon Fox, Wray Dudley.
1920 "The Electric Reversing Mill Considered From the Standpoint of Tonnage," by K. A. Pauly.
1924 "Electrically Driven Reversing Mills," by J. D. Wright, R. W. Davis and O. H. Needham.
1924 "Engine vs. Motor Drive for Reversing Blooming Mill," by C. H. Hunt.

Electric Driven Mills.

1913 "Present Status of Motor Drive for Main Rolls of Steel Mills," by Brent Wiley.
1913 "Questions of Motor Drive for Main Rolls," by F. Friedlaender.
1913 "Variable Speed Drives for Main Rolls of Steel Mills," by K. A. Pauly.
1914 "Economies of Electric Drives in Steel Mills," by Wilfred Sykes.
1918 "Practical Operation of Motor Driven Continuous Mills," by H. C. Cronk.
1918 "Electric Driven Plate Mills," by G. E. Stoltz.
1919 "Electrically Driven Mills," by J. T. Sturtevant.
1920 "General Specifications for A. C. Motors for Main Roll Drives," by Standardization Committee of A. I. & S. E. E.
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1920 "Electrical Features of a Modern Steel Plant," by R. B. Gerhardt.
1920 "Sheet and Tin Mills," by A. B. Holcomb.
1921 "Review of Cost of Rolling Steel," by G. E. Stoltz.
1924 "Adjustable Speed Drives for Rolling Mills," by L. A. Umansky.
1924 "Electrification of Tata Iron Works at Jamshedpur, India," by S. Ghosh.

Auxiliary Drives.

1919 "Influence of Gear Ratio on Speed of Operation, Motor Heating and Contactor Wear in Auxiliary Steel Mill Drives," by J. E. Fries.
1919 'Auxiliary Drives," by Gordon Fox.
1919 "Hydraulic vs. Electric Drives for Steel Mill Auxiliaries," by R. B. Gerhardt.
1920 "Auxiliary Drives" by Gordon Fox.

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1907 "Heavy Starting and Heavy Duty D. C. Motors in Steel Plants," by G. W. Richardson.
1907 "New Mill Motor," by J. A. Seede.
1907 "Mill Motors," by Gano S. Dunn.
1907 "Type W Motors for Mill Service," by R. B. Treat.
1908 "Report on Operation of Stoeckel Induction Drives," by G. H. Winslow.
1908 "Electric Motors for Heavy Torque and Rapid Reversals," by G. W. Richardson.
1908 "The Induction Drive," by A. P. Stoeckel.
1908 "Mill Type Motors A. C. and D. C. With Controllers," by D. F. Smalley.
1908 "Crocker Wheeler Mill Motors," by Gano S. Dunn.
1908 "The Electric Motor Drive," by E. W. Yearsley.
1908 "Mill Type Motors and Their Control," by C. D. Knight.
1908 "A. C. and D. C. Motors," by Gano S. Dunn.
1908 "Mill Type Motors," by M. A. Whiting.
1909 "Crane Motors," by Geo. W. Richardson.
1909 "Low Speed Motors vs. Motors in Series," by R. B. Treat.
1911 "Direct Connected Reversing Motor Drive for Planers," by Geo. W. Richardson.
1911 "Recent Developments of Motors for Steel Mill Service," by Brent Wiley.
1911 "Cost and Efficiency of Alternating vs. Direct Current Motors for Steel Mill Auxiliaries," by R. B. Shover and Edw. J. Cheney.
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1914 "Machine Tool Motor Applications and Their Operating Characteristics," by Charles Fair.
1914 "Electrically Driven Reversing Mills," by Wilfred Sykes.
1916 "Cost vs. Upkeep of D. C. Motors," by A. M. MacCutcheon.
1916 "The Advantages of Modern Types of D. C. Machines," by David Hall.
1916 "Operating Characteristics of an Electric Reversing Blooming Mill," by E. S. Jeffries.
1916 "Alternating Current Phase Wound Motors vs. Adjustable Speed Direct Current Motors" by D. M. Petty.
1917 "Electrical Reversing Blooming Mills," by R. D. Nye.
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1918 "Standardized Motors for the Steel Industry," by W. T. Snyder.
1918 "Auxiliary Motors for Steel Mills," by J. D. Wright.
1918 "Electric Driven Plate Mills," by G. E. Stoltz.
1919 "A.C. vs. D.C. Motors for Rolling Mill Table Drives," by W. S. Hall.
1919 "General Specifications for A. C. Motors for Main Roll Drives," by Standardization Committee.
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1921 "Continuous Rated or 50 Degree Rise Motors," by I. F. Adams.
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1923 120-in. Motor Driven Plate Mill," by Walter C. Kennedy.
1923 "Motor Driven Accumulator Pumps," by J. R. Penman.
1923 "Motor Operated Centrifugal Pumps in Steel Plants," by B. A. Cornwell.
1923 "Some Factors Entering Into the Selection of Motors for Mine Hoists," by F. W. Cramer and A. A. MacDonald.
1923 "Adjustable Speed Motor Drives," by R. W. Davis.
1924 "The Motor That Corrects Power Factor," by H. W. Weichsel.
1924 "Mechanical and Electrical Analyses of 40-inch Blooming Mill Screw Down," by F. D. Egan.

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1907 "The Auxiliary Control and Automatic Acceleration of Electric Motors, by E. W. Yearsley.
1907 "Magnetic Switch Controllers," by C. S. Pirtle.
1907 "Magnetic and Mechanical Control for Motors," by C. T. Henderson.
1908 "Control of Motor Driven Auxiliary Apparatus in Steel Mills," by H. D. James.
1908 "New Resistance Grid Interlocking Systems—Controlling Apparatus at Gary," by C. T. Henderson.

1908 "Combination Manual and Magnetic Switch Controllers," by H. F. Stratton.
1908 "Mill Type Motors and Their Control," by C. D. Knight.
1909 "A Steel Mill Starter for D.C. Motors," by C. S. Pirtle.
1909 "Controls and Their Advantages," by A. C. Eastwood.
1909 "Allen Bradley Controllers and Starters," by Lynd Bradley.
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1910 "Motor Control," by M. A. Whiting.
1911 "New Development in Control Apparatus for Steel Mills," by M. A. Whiting.
1911 "Automatic Motor Control," by Arthur C. Eastwood.
1911 "An Electrically Operated Control Pumping Station," by F. W. McKee.
1912 "Blast Furnace Skip and Bell Hoists," by A. E. Handy.
1912 "Automatic Speed Regulating Equipment for Induction Motors for Fly-Wheels," by E. J. Cheney.
1912 "Dynamic Braking," by R. B. Davenport.
1913 "Control Characteristics of Direct Current and Induction Motors," by M. A. Whiting.
1913 "Recent Developments in Switching Devices for Power Circuits," by J. N. Mahoney.
1913 "Variable Speed Drives for Main Rolls of Steel Mills," by K. A. Pauly.
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1914 "Control Apparatus for Operating the Locks in the Panama Canal," by E. M. Hewlett.
1914 "Application of Automatic Control to Machine Tools," by H. W. Eastwood.
1914 "Magnetic Brakes," by B. E. Fernow, Jr.
1915 "Protection and Control of Industrial Electric Power," by Chas P. Steinmetz.
1916 "Latest Developments in New Apparatus and Appliances," by Electric Development Committee.
1916 "The Operation of Mechanically Connected Direct Current Motors, Permanently in Series or Permanently in Parallel," by H. F. Stratton.
1916 "Control of D.C. and A.C. Motors as Applied to Cranes," by Paul Caldwell.
1917 "Electric Skip Hoists and Bell Hoists," by H. D. James and F. J. Burd.
1917 "Recent Developments in Automatic Control," by F. P. Townsend.
1917 "An Automatic Starter for Induction Motors," by H. F. Stratton.
1917 "Control Standardization," by T. E. Barnum.
1917 "Grab Bucket Coal Hoists Operated by A.C. Motors With Dynamic Braking and Regenerative Braking," by James Farrington and R. H. McClain.
1918 "Main Hoists for Open Hearth Ladle Cranes," by W. W. Garrett, Jr.
1918 "Automatic Engine Stops," by Walter Greenwood.
1918 "Remote Controlled Sub-Stations," by W. T. Snyder.
1918 "Control Standardization," by L. W. Egan.
1919 "Recent Improvements in Industrial Control," by H. D. James.
1919 "Overload Protection for Motors," by P. M. Lincoln.
1919 "Overload Protection on Cranes," by A. G. Place.
1920 "Automatic Control of Reversing Rolling Mill Equipment," by E. S. Lammers, Jr.
1920 "Control of Mill Tables and Screw Downs," by Walter Kennedy.
1920 "Slip Regulators vs. Notchbacks," by Gordon Gage.
1921 "Dynamic vs. Mechanical Braking," by G. W. Richardson.
1921 "The Control of Boiler Operation," by W. N. Flanagan.
1921 "Some Recent Developments in Induction Motor Starting," by A. C. Spencer.
1921 "Control Requirements Auxiliary Motors," by J. D. Wright.
1922 "Report of Control Committee," by F. W. Cramer, Chairman.
1922 "Automatic and Remote Controlled Substations as Applied to Steel Mills," by J. K. Ostrander.
1923 "Controllers for Ore Unloaders and Ore Bridges," by N. L Mortensen.
1923 "Electric Crane Wire Diagram," by George W. Richardson.
1923 "Foot Control," by G. J. Walz.
1923 "The Liquid Slip Regulator or Rheostat," by D. M. Petty.
1924 "Direct Current Hoist and Trolley Control for Ore Bridges," by N. L. Mortensen.

Electric Overhead Travelling Cranes

1907 "New Types of Soaking Pit Cranes," by E. D. Kendall.
1909 "Crane Motors," by Geo. Richardson.
1910 "A. I. & S. E. E. Standard Crane Specifications," by Standardization Committee.
1911 "Electric Cranes for Steel Mill Service," by E. Friedlaenden.
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1914 "Magnetic Brakes," by B. G. Fernald.
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1919 "Main Hoists for Open Hearth Ladle Cranes," by W. W. Garrett, Jr.
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1923 "Some Steel Mill Crane Problems," by A. J. Standing.
1923 "Electric Cranes," by F. H. Woodhull.
1924 "Crane Hoist Travel Limit Devices," by Walter Greenwood.

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1909 "The Production of Steel and Iron in the Electric Furnace," by E. W. Yearsley.
1909 "Electric Furnaces," by J. A. Seede.
1913 "Notes on the Present Status of Electric Furnaces," by Wilfred Sykes.
1915 "Progress in the Iron and Steel Industry and the Electric Furnace," by Dr. Carl Geo. Frank.
1915 "The Melting of Alloys in the Electric Furnace," by E. S. Wile.
1916 "Mechanical and Electrical Operation of the Heroult Electric Arc Furnace," by Geo. W. Richardson.
1917 "Heroult Electric Furnaces," by Walter C. Kennedy.
1917 "Electric Furnaces," by J. D. Donovan.
1918 "The Electric Furnace for Annealing Treatment and Forging of Steel," by Wirt S. Scott.
1918 "Electric Furnaces," by L. B. Lindemuth and Geo. H. Schaeffer.
1919 "Present Status of Electric Furnaces in the Steel Industry," by Electric Furnace Committee.
1920 "Report of Electric Furnace Committee," E. T. Moore, Chairman.
1921 "Electric Annealing or Heat Treating Furnaces," by Geo. P. Mills.
1921 "Electric Furnace Report," by E. T. Moore.
1923 "Electric Heating of Finishing Rolls of Sheet and Tin Mills," by Gordon Fox.
1923 "Electric Furnace Phenomena," by Edward T. Moore.
1924 "An Electrical Method for the Heat Treatment of Carbon Steel," by J. F. Jelley.
1924 "The Economies of Electric Heat in Metallurgical Processes," by Dwight D. Miller.
1924 "Electric Furnace Installation," by R. S. Sawdey.

1924 "Report of Electric Furnace Committee for 1924," by George H. Schaeffer, Chairman.
1924 "Electric Melting Furnaces," by J. A. Seede.
1924 "Medium Temperature Furnace Installations," by C. F. Cone.
1924 "Medium and Low Temperature Applications," by E. A. Hurme.
1924 "Electric Heating With Special Reference to Central Stations," by E. D. Sibley.

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1909 "Some Important Phases of Electric Power for Steel Mills," by Charles F. Scott.
1910 "First Cost and Operating Expense of Mixed vs. Exclusively Altenating Systems in Steel Mills," by Gano Dunn.
1912 "Power Problems in Steel Mills," by Wilfred Sykes.
1914 "A Synchronous Condenser Installation for Power Factor Correction and Voltage Regulation," by W. O. Oschmann.
1915 "Improving Non-Condensing Power Plant by Use of D. C. Mixed Pressure Turbine Equipment," by R. F. Patterson.
1915 "Recent Developments in Power Generating Apparatus." by P. M. Lincoln.
1918 "Some Fundamental Considerations of Power Factor Correction," by R. A. McCarty.
1920 "Steel Plant Power Generation from Waste Heat and Coal," by B. H. Greene.
1920 "Some Economic Considerations in the Design of Power Plants for Steel Mills," by T. E. Keating.
1920 "Application of Waste Heat Boilers to Open Hearth Furnaces," by Thos. R. Tate.
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1921 "Power Rectifiers," by J. D. Milliken.
1921 "The Economical Generation of Power," by A. B. Clark.
1921 "Pulverized Firing in Steam Generation," by F. J. Crolius.
1921 "Power Factor Correction and Its Relation to Plant Operation," by P. T. Vanderwart.
1922 "Power Transmission in Industrial Plants," by Kenneth M. Raynor.
1922 "The Application of Electic Power in the Iron and Steel Industry," by W. S. Hall
1922 "Reducing Power Bills on Mine Fans With Synchronous Motors," by Frank W. Cramer and A. A. MacDonald.
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1922 "Internal Combustion Engines for Power Generation in Steel Mills," by D. M. Petty.
1923 "Improvements in Steam Practice as Accomplished at Lukens Steel Company," by G. D. Spackman.
1924 "Power Generation in Modern Steel Works," by G. R. McDermott.
1924 "Electric Power at Portsmouth Works of Wheeling Steel Corporation," by H. C. Mosley and R. H. Rogers.
1924 "The Giant Power Survey of Pennsylvania," by Judson C. Dickerman.
1924 "Power in the Iron and Steel Industry," by Barton R. Shover.
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1911 "Prime Movers for Central Stations, Their Economic Relations," by Edwin D. Dreyfus.
1912 "The Mixed Pressure Steam Turbine With Special Reference to the Use of the Steam Regenerator," by E. D. Dickensen.
1913 "Direct Current Turbine Generating Units," by H. A. Rapelye.
1914 "High, Low and Mixed Pressure Turbines," by Francis Hodgkinson.
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1917 "Factors Relating to the Economical Generation and Use of Electric Power in the Steel Industry," by Brent Wiley.
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1923 "Possibilities in Stage Heating and Steam Extraction in Steel Mill Power Plants," by H. T. Watts.
1923 "The Generation of Steam by Electricity," by P. H. Falter.

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1919 "Grounding the Neutral for D. C. Distribution Systems," by W. H. Price.
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1915 "The Electrification of Steel Mills and the Use of Central Station Power," by Brent Wiley and Wilfred Sykes.
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1916 "Central Station Power for Steel Mills," by Central Station Power Committee, A. I. & S. E. E.
1916 "The Use of Central Station Power Service in Steel Mills," by Jos. McKinley.
1917 "Central Station Power Supply to Iron and Steel Industry," by Jos. McKinley and R. L. Baker.
1917 "Central Station Power," by W. H. Hornlein.
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Steel Mill Lighting.

1907 "Cooper-Hewitt Lamps for Industrial Lighting," by F. R. Fortune.
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1909 "Flaming Arc Lamps, Their Operation and Demonstration," by C. J. Toerring.
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1911 "Special Lighting for Steel Mills," by H. M. Gassman.
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1912 "Curves and Data for Illumination Calculations," by C. J. Mundo.
1912 "Modern Illuminations in Iron and Steel Industry," by C. E. Clewell.
1913 "The Mercury-Vapor Quartz Lamp," by W. A. D. Evans.
1913 "A Progress Report on Illumination," by Ward Harrison and H. H. Magdsick.
1914 "The Flaming Arc Lamp in the Iron and Steel Industry," by A. T. Baldwin.
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1917 "Some Recent Advances in Industrial Lighting," by Ward Harrison.
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1922 "Report of Sub-Committee on Illumination," by Ward Harrison.
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1924 "Steel Works Lighting," by D. W. Blakeslee.

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1916 "Standardization Committee Report," by F. D. Egan, Chairman.
1917 "Motor Standardization," by F. B. Crosby.
1917 "Control Standardization," by T. E. Barnum.
1917 "Crane Standardization," by D. M. Petty.
1917 "Standardization," by W. T. Snyder.
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1918 "Cranes," by John D. Scully.
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1921 "Electric Overhead Traveling Cranes," by F. W. Cramer.
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1921 "Motors," by D. M. Petty.
1922 "Report of the Standardization Sub-Committee on Transmission—An Investigation of Insulators in Steel Mill Service," by Arthur R. Leavitt, Chairman.
1923 "Standardization of Engine Stops," by Walter Greenwood.
1924 "Calumet and Crawford Avenue Stations of the Commonwealth Edison Company, Chicago, Ill.," by W. F. Sims.
1924 "Decisions of the Public Service Commission of the State of Pennsylvania Relative to Rates of Electric Light and Power Companies," by F. Herbert Snow.
1924 "The Steel Industry and the Electric Utilities," by Merril Skinner and F. D. Mahoney.

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1912 "Arc Welding," by J. F. Lincoln.
1912 "Electric Welding Machines," by Frank Warren.
1912 "The Accomplishments and Possibilities of the Oxy-Acetylene Welding Process," by M. S. Pumley.
1917 "Some Recent Investigations in Arc Welding," by O. H. Eschholz.
1918 "Electric Arc Welding," by H. L. Unland.
1919 "Automatic Electrolytic Oxy-Hydrogen Plant," by F. H. Woodhull.
1919 "Present Status of Arc Welding in the Iron and Steel Industry," Joint Paper.
"The Plastic Arc System of Welding," by A. Churchward.
"Arc Welding Equipment for Steel Mills and Foundries," by H. L. Unland.
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1921 "Steel Plant Maintenance by Autogenous Welding," by W. Petry.
1923 "Simultaneous Production of Oxygen and Hydrogen," by I. H. Levin.
1924 "Spot Welding," by G. A. Hughes.

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1910 "Consideration of Safety in the Design of Standard Apparatus," by C. Pirtle.
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1912 "Safety in Coal Mining," by Dr. Jos. A. Holmes.
1912 "Work of the Federated Government for the Prevention of Railroad Accidents and Its Results," by Charles C. McChord.
1912 "Industrial First Aid," by Dr. M. J. Shields.
1912 "Labor—A National Asset," by Dr. Edward A. Steiner.
1912 "Proceedings of the First Co-operative Safety Congress," A. I. & S. E. E.
1914 "Organized Safety," by L. R. Palmer.
1915 "Installation of Electrical Equipment to Comply With the Requirements of Safety," by Walter Greenwood.
1915 "The Relation of Physical Examination to Electrical Work," by Stewart C. Coey.
1916 "Review of Safety Work of A. I. & S. E. E.," by W. T. Snyder.
1917 "Safeguarding Electric Equipment," by Walter Greenwood.
1917 "General Safety Movement and Accident Prevention," by Safety Committee.
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1919 "Safety Rules for Government of Employes Working on Electrical Equipment," by Safety Committee.
1919 "Safety Movement in Steel Mills," by C. M. Brading and F. A. Wiley.
1920 "Standardization of Electrical Equipment and Its Relation to Accident Hazard," by Walter Greenwood.
1921 "Comments on Safety Committee Work," by Walter Greenwood.
1922 "Safety Organization—General Safety Rules—By Safety Committee," by F. A. Wiley, chairman.
1922 "Safety Switches," by P. T. Vanderwaart.
1924 "The Freret Safety Enclosed Knife Switch," by A. L. Freret.

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1908 "Increase of Production by Machinery on Motor Driven Line Shaft," by G. H. Winslow.
1908 "Electric Drilling and Reaming," by F. W. Stevens.
1914 "Application of Automatic Control to Machine Tools," by H. W. Eastwood.
1914 "Machine Tool Motor Application and Their Operating Characteristics," by Charles Fair.
1916 "Portable Electric Tools as Applied to the Iron and Steel Industry," by F. A. Andresen.
1917 "Standardization of Electrical Apparatus for Cranes and Machine Tools," by Houston Cosdon.
1919 "Machine Tool Drives, Motors and Controllers," by H. W. Tice.
1923 "General Specifications for Construction and Installation of Automatic Engine Stops," by Safety Committee, Walter Greenwood, Chairman.

1924 "Machine Tools and Their Auxiliaries in the Steel Mills," by J. F. Kelly.

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1909 "New Developments in Electrical Apparatus," by K. A. Pauly.
1913 "Recent Developments in Switching Devices for Power Circuits," by J. M. Mahoney.
1914 "Some Electrical Problems Practically Considered," by B. G. Lamme.
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1915 "Some of the Latest Developments in Electrical Equipment," by K. A. Pauly.
1915 "Some Electrical Applications in Steel Mill Practice," by D. M. Petty.
1916 "Latest Developments in New Apparatus and Appliances," by Electrical Development Committee.
1917 "Recent Electrical Applications in the Steel Mill Industry," by G. E. Stoltz.
1918 "Report of Electrical Development Committee," by W. C. Kennedy, Chairman.
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1915 "Repair and Depreciation of Electrical Apparatus," by G. E. Stoltz.
1916 "The Value of Records to an Operating Engineer," by R. S. Huey.
1916 "Costs vs. Upkeep of D. C. Motors," by A. M. MacCutcheon.
1917 "Power Accounting," by W. O. Oschmann.
1919 "Inspection and Operation of Electrical Apparatus," by J. A. Morgan and J. J. Booth.
1919 "Educational Training for Electrical Employes," by B. A. Cornwell.
1919 "Electrical Repair Shop," by C. A. Menk.
1919 "Storeroom and Spares," by T. E. Tynes.
1919 "Records and Tests," by R. B. Gerhardt.
1919 "Electrical Department Organization in a Steel Mill and Its Duties," by W. C. Suppler.
1920 "Steel Mill Electrical Repair Shop Practice," by A. J. Standing.
1922 "Departmental Organization," by L. H. Mandeville and R. F. Gale.
1923 "Systematizing the Work of an Electrical Engineering Division," by P. T. Vanderwaart.
1924 "Developments in Electric Maintenance Shop Practice," by A. C. Cummins.
1924 "Discussion: Developments in Electric Maintenance Shop Practice," by W. H. Burr, N. E. Drexler, Jesse L. Jones, A. L. Reichert, G. A. Rowe, D. W. Blakeslee, A. W. Boley, A. W. Mohrman, A. Hoyt Levy, John Glew, B. A. Cornwell, Arthur J. Whitcomb, G. E. Stoltz, W. G. Colson, A. J. Standing, W. T. Snyder, George Richardson, O. W. Bodler, J. A. Morgan, John C. Reed and F. O. Schnure.

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1908 "New Aluminum Steel Lightning Arresters," by D. B. Rushmore.
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1907 "Relative Efficiency of Insulation of 220 and 440 Volt Apparatus," by C. E. Skinner.
1912 "Winding of Electric Machines," by H. C. Specht.
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1914 "The Apprenticeship System as Applied to Steel Mills," by B. W. Gilson.
1916 "Apprenticeship Systems," by Educational Committee.
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1919 "Education of Electrical Employes," by A. B. Holcomb, Chairman.
1920 "Practical Education of Steel Mill Electricians to Increase Production," by B. A. Cornwell, Chairman.
1921 "Report of Educational Committee," by L. F. Galbraith.

Inspection of Steel Mill Plants.

1917 "Central Steel Company, Massillon, Ohio."
1917 "United Alloy Steel Company, Canton, Ohio."
1918 "Carnegie Steel Company, Youngstown, Ohio."
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1908 "Electric Lifting Magnets for Breaking Scrap," by Geo. Richardson.
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1908 "The Application of Storage Batteries to Iron and Steel Mills," by R. C. Hull.
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1909 "Leblanc Condensers," by Edwin Yawger.
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1922 "Care and Operation of Power Transformers," by J. G. Corrin.

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1910 "New Graphic Recorder for Steel Mill Service," by H. W. Young.
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1924 "An Easy Method for Obtaining the Effective Motor Load From a Graphic Meter Chart," by D. W. Blakeslee.

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1917 "Manufacture, Selection and Use of Carbon Brushes," by E. H. Martindale.
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1924 "Gear Drives in the Steel Mill," by H. H. Talbot.

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1911 "Lubrication and Methods of Lubricating Cranes," by T. E. Tynes.

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1917 "Flywheels for Rolling Mill Applications," by G. E. Stoltz.

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1920 "Steel Plant Power Generation From Waste Heat and Coal," by B. H. Greene.
1920 "Application of Waste Heat Boilers to Open Hearth Furnaces," by Thos. R. Tate.

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1919 "New Plate Mill of Brier Hill Steel Company," by G. Rhodes.
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1921 "Frequency Problem in the Steel Industry," by B. G. Lamme.
1921 "Power Generation in Steel Mills and Its Relation to Frequency," by D. M. Petty.
1922 "The Operation of Frequency Changers," by L. M. Smith.

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1907 "A. C. Generators and Induction Motors," by E. Heitman.

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1911 "An Electrically Operated Central Pumping Station," by F. W. McKee.

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1915 "Wire Rope and Its Relation to Steel Making," by J. F. Howe.

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1922 "Judging the Combustion of Gaseous Fuels from Gas Analysis," by A. G. Witting.
1922 "The Efficient Burning of Fuel and Use of Waste Gases in Iron and Steel Plants," by W. W. Pettibone.
1922 "Value of By-Product Gas to Industry," by H. Dobrin.
1922 "Fuel Gases and Their Use in Iron and Steel Plants," by H. S. Watts.
1922 "Topical Discussion Stokers and Their Recent Developments," by F. A. DeBoos, T. A. Marsh, H. F. Lawrence, James Harrington, J. V. Baum, F. H. Daniels and Thomas Peebles.
1922 "The Relation of the Engineer to Fuel Conservation," by Joseph W. Hays.
1923 "The Combustion Flame Electrode," by George T. Southgate.
1923 "The Tempering of Coal," by Thomas A. Marsh.
1923 "Surface Combustion and Its Application," by W. M. Hepburn.
1923 "Economical Use of Fuel in the Steel Plant," by H. C. Seibert.
1924 "General Phases of Pyrometry and Temperature Control in the Steel Industry," by O. Brewer.
1924 "Control of Pressure Gas Producers," by W. P. Chandler, Jr.
1924 "Measurement of Input and Output in Boiler Rooms," by J. M. Spitzglass.
1924 "The Prevention of Scale Formation by Boiler Water Conditioning," by R. E. Hall, Carl Fischer and George Smith.
1924 "The Chapman Stein Recuperator," by Wm. C. Buell, Jr.
1924 "The Ljungstrom Air Preheater," by B. G. Brolinson.
1924 "Some Applications of Oxygen to Ferrous Metallurgy," by F. W. Davis.
1924 "The Slagging Producer in Steel Works," by K. Huessener.
1924 "Combustion Control," by E. G. Bailey.
1924 "Pulverized Coal Used as Fuel in Sheet Mills," by John Glew.

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1922 "Bent Tube vs. Straight Tube Boilers," by Walter N. Flanagan.
1922 "The Trend of Boiler Development," by J. B. Crane.
1922 "Boiler Practices of 1922," by R. E. Butler.
1922 "The Modern Sectional Header Boiler," by R. M. Rush.
1922 "Heine Boiler Practices in 1922," by E. R. Fish and Alfred Cotton.
1923 "Boiler Troubles from the Operating Man's Standpoint," by Carl J. Smith.
1923 "High Pressure Steam Boiler," by D. S. Jacobus.

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1922 "Improved Rolling Mill Practice Obtained by the Use of Direct Current Motors for Main Roll Drive," by G. E. Stoltz.

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1907 "Apparatus Built by the General Electric Company for Mill Service," by D. B. Rushmore.
1912 "Direct Current Motor Field Coils," by R. B. Treat.
1914 "Statistical Data of Electrical Applications in the Iron and Steel Industry in the United States," by R. Tencher.
1914 "Switchboard and Switching for Steel Mills," by Saul Lavine.
1914 "Silent Chain Power Transmission," by F. L. Morse.
1914 "Control Apparatus for Operating the Locks in the Panama Canal," by E. M. Hewlett.
1915 "Mechanical Analogies in Electricity and Magnetism," by Prof. W. S. Franklin.
1915 "Automatic Telephones in the Steel Industry," by Samuel Suekoff.
1915 "The Application of the Principle of Surface Contact to Industrial Haulage," by Chas. L. Kinslow.
1916 "Object and Scope of the A. I. & S. E. E.," by W. T. Snyder.
1916 "Reminiscences of Niagara," by P. M. Lincoln.
1916 "Design of Structures for Steel Mills," by Charles A. Randorf.
1917 "Fuel Economy by Co-operation in Establishing Better Practice in the Operation of Stokers and Boilers," by J. G. Worker.
1917 "Tool Steel Gears and Pinions for Mills and Industrial Service," by E. S. Sawtelle.
1918 "Automatic Engine Stops," by Walter Greenwood.
1918 "Measuring Gas Electrically," by J. C. Wilson.
1918 "Automatic Door Hoists for Open Hearth Furnaces," by W. H. Burr and H. A. Lewis.
1919 "Electric Heat Treatment," by C. A. Winder.
1919 "Electrical Features of Hogg Island Shipyard," by H. W. Osgood.
1919 "Outdoor Sub-Station Practice and Use of Carbon-Tetrachloride Fuses," by Alfred Alsaker.
1919 "Electricity Applied to the Mechanical Mining of Coal," by C. B. Reed.
1919 "Electric Locomotives for Industrial Purposes," by Walter Fixter and Kenneth Andrews.
1920 "Babbitt and Babbitting," by T. D. Lynch.
1921 "The Bessemer Process of Making Steel," by John Sullivan.
1921 "Pulverized Firing in Steam Generation," by F. J. Crolius.
1921 "Power Factor Correction and Its Relation to Plant Operation," by P. T. Vanderwart.
1921 "Alternating Current in By-Product Plants," by W. V. Dunn.
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1921 "Electrification Steel Plant Railroads," by R. B. Gerhardt.
1921 "The Electrical Engineer in the Steel Plant and Out," by F. B. Crosby.
1921 "Fuel Requirements in Steel Mills," by F. E. Leahy.
1921 "The Influence of Cheap Oxygen on Economy of Fuel and of Time," by E. A. W. Jefferies.
1922 "Care and Operation of Power Transformers," by J. G. Corrin.
1922 "Electrification of the International Nickel Company's Works for Monel Metal," by F. C. Watson.
1922 "Electrification of Industrial Plant Railways," by D. M. Petty.
1922 "Manufacture of Phosphoric Acid," by Theodore Swann.
1922 "Automatic and Remote Controlled Substations as Applied to Steel Mills," by J. K. Ostrander.

1922 "Some Considerations in the Electrification of the Steel Plant Railroad Yard," by R. B. Gerhardt.
1922 "A Review of Steel Mill Electrification," by B. G. Lamme and W. Sykes.
1922 "Electrical Development Committee Report for 1922," by R. B. Gerhardt, Chairman.
1922 "Internal Combustion Engines for Power Generation in Steel Mills," by D. M. Petty.
1922 "Roller Bearings Applied to the Steel Industry," by L. J. Hess.
1922 "Electric Heating Applied to the Steel Industry," by F. A. Hansen.
1923 "Electric Transportation," by F. O. Schnure.
1923 "The Complete Electrification of the Foundry Industry," by Leonard W. Egan.
1923 "A System of Coal and Ore Bridge Traverse Control for Protection Against Wind and Skewage Hazards of Skew Type Direct Current Bridges," by P. R. Canney.
1923 "Report of Special Bearings Committee," by D. M. Petty, Chairman.
1923 "Ore Handling Costs," by Walter Burr.
1923 "Flexible Couplings for Steel Mills and Other Drives," by John J. Serrell.
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1923 "The Thomas Flexible Coupling," by J. H. Albrecht.
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1923 "Flexible Couplings," by L. H. Keim.
1924 "Experiences with Multiple Feed, High Pressure Lubrication," by L. R. Humpton.
1924 "Electricity in the Pipe Foundry," by James W. Moore.
1924 "The Magnetized Roller Conveyor," by Harry Hollis.
1924 "Third Rail Locomotives for Yard Service," by F. O. Schnure.
1924 "Modern Methods of Lubrication as Applied to Cranes in Steel Mills," by H. E. Thompson.
1924 "Power Factor Correction," by R. A. Neal.
1924 "Electric Mining Equipment, Its Selection, Care and Operation," by A. F. Elliott.
1924 "Electrical Industrial Locomotives," by Frank E. Fisher.
1924 "Breaking Spindles for Main Roll Drives," by J. H. Albrecht.
1924 "Anti-Friction vs. Sleeve Bearings," by J. S. Murray.
1924 "Application of Taper Roller Bearings to Motors in the Steel Industry," by T. V. Buckwalter.
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1924 "Mounting and Maintenance of Roller Bearings on Electric Motors," by D. E. Batesole.
1924 "Ball Bearing Applications and Maintenance," by H. R. Reynolds.
1924 "The Practical Application of Anti-Friction Bearings to Electric Motors," by H. E. Brunner.
1924 "Selection, Installation and Operation of Anti-Friction Bearings in Heavy Duty Service," by J. T. R. Bell.
1924 "The Mounting and Maintenance of Roller Bearings in Electric Motors," by W. B. Wachtler.
1924 "Design and Application of Ball Bearings to Motors," by T. D. Crow.
1924 "Automatic Substations," by R. F. Wensley.
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"Apparatus Built by the General Electric Company for Mill Service," by D. B. Rushmore.

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"New Mill Type Motor," by J. A. Seede.

"New Types of Soaking Pit Crane," by D. Kendall.

"Mill Motors," by Gano S. Dunn.

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"Report on Operation of Stoeckel Induction Drive," by G. H. Winslow.

"Electric Drilling and Reaming," by F. W. Stevens.

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"Control of Motor Driven Auxiliary Apparatus in Steel Mills," by H. D. James.

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"The Application of Storage Batteries to Iron and Steel Mills," by R. C. Hull.

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"The Practical Application of Anti-Friction Bearings to Electric Motors," by H. E. Brunner.

"Selection, Installation and Operation of Anti-Friction Bearings in Heavy Duty Service," by J. T. R. Bell.

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DOMINION IRON & STEEL CO., LTD., Sydney, C. B., Nova Scotia, Canada. Mark Workman, President, Montreal; H. D. McDougal, General Superintendent, Sydney. May 9, 1917.

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LE FLAIVE & CIE, La Chaleassiere, St. Etienne, France, August 30, 1919.

LORAIN STEEL COMPANY, Daniel Coolidge, President, Johnstown, Pa. January 20, 1917.

LUKENS STEEL COMPANY, A. F. Huston, President; H. B. Spackman, Vice President, Coatesville, Pa. April 20, 1918.
MIDVALE STEEL COMPANY, A. C. Dinkey, President, Philadelphia, Pa. February 17, 1917.
NATIONAL TUBE COMPANY, Wm. M. Schiller, President, Frick Bldg., Pittsburgh, Pa. January 20, 1917.
REPUBLIC IRON & STEEL COMPANY, Thos. J. Bray, President, Youngstown, Ohio. January 20, 1917.
SHARON STEEL HOOP COMPANY, Severn P. Ker, President, Sharon, Pa. January 20, 1917.
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TENNESSEE COAL, IRON & R. R. COMPANY, Geo. G. Crawford, President, Birmingham, Ala. January 20, 1917.
TRUMBULL STEEL COMPANY, Warren, Ohio. J. W. Warren, President. July 20, 1917.
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WISCONSIN STEEL COMPANY, H. F. Perkins, President, 606 S. Michigan Blvd., Chicago, Ill. January 20, 1917.
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Constitution & By-Laws of A. I. & S. E. E.

Amended September 11th, 1918
Amended July 11th, 1919
Amended September 20th, 1920
Amended September 11th, 1922

CONSTITUTION

ARTICLE I

Name and Object

1. The name of this Association is the "ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS."

2. The OBJECT of this Association shall be the advancement of the application of electricity to the iron and steel or allied industries by the co-operation of its members.

3. The MEANS to be employed for attaining this end shall be periodical meetings for the reading of professional papers, the discussion of pertinent subjects, and the publication of such papers and discussions as may seem expedient.

ARTICLE II

Membership

1. The MEMBERSHIP of the Association shall consist of persons actively engaged in or identified with the application of electricity, or general engineering practices to the iron and steel or allied industries, and firms engaged in the manufacture of iron and steel.

2. The classes of membership shall be eight in number, namely, Honorary, Life, Management, Active Engineering, Active, Engineering, Associate and Firm.

3. Honorary, Life, Firm, Engineering and Associate members shall be entitled to all the rights and privileges of the Association except the right to vote and hold office.

4. HONORARY MEMBERS shall be persons who have rendered acknowledged eminent service to electrical engineering in the iron and steel or allied industries.

5. LIFE MEMBERS shall be persons who have rendered acknowledged eminent service to the Association of Iron & Steel Electrical Engineers.

6. The members listed under the classification of MANAGEMENT shall be persons not less than 21 years of age who occupy the positions of, or similar to, General

Works Managers, or General Superintendents in the iron and steel or allied industries.

7. ACTIVE ENGINEERING MEMBERS shall be persons not less than 21 years of age actively identified with the design, installation, operation and maintenance of electrical or mechanical apparatus used in the iron and steel or allied industry, or (b) persons under whose jurisdiction the above members come but who are not entitled to be listed under the "Management" classification.

8. ACTIVE MEMBERS shall be persons not less than 21 years of age actively identified with or having responsible charge in the application of electrical or mechanical apparatus used in the iron and steel or allied industries.

9. ENGINEERING MEMBERS shall be persons not less than 21 years of age actively identified with the design of electrical or mechanical apparatus used in the iron and steel or allied industries.

10. ASSOCIATE MEMBERS shall be persons not less than 21 years of age actively identified with the application of electricity or appliances to the iron and steel or allied industries, (b) persons engaged in the manufacture or sale of material or apparatus used in the iron and steel or allied industries.

11. FIRM MEMBERS shall include those companies engaged in the manufacture of iron and steel.

ARTICLE III

Admission, Transfer and Expulsion of Members

1. APPLICATION for admission to active and associate membership shall be on a form prescribed by the Board of Directors, and shall embody a full record of the general and technical education of the applicant and of his professional career. Forms shall be signed by the applicant and shall give for reference the names of at least three members by whom applicant is personally known.

2. In the event of unfavorable or failure to receive replies from references, the applicant may be called upon to give other references. Should applicant be not personally known by three members, reference to other Engineers of standing may be accepted.

3. Reference to members to whom applicants are personally known may be waived in case of foreign applications, but the applicants shall in that case refer to at least two engineers of recognized standing.

4. ADMISSION to Honorary Membership shall require nomination by unanimous vote of the Board of Directors, and election by vote of not less than three-fourths of Active members present at the annual meeting.

5. ADMISSION of Active and Associate members shall be by unanimous vote of the Board of Directors after application has been made in due form and approved by the full Membership Committee, and by payment of entrance fee.

6. ACCEPTANCE OF ELECTION to membership must be within six months of date of election.

7. TRANSFER from Associate to Active Membership may be made in accordance with this Constitution by application to the Board of Directors, whose decision by unanimous vote shall be final.

8. TRANSFER from Active to Associate Membership shall be made immediately upon an active member's activities being as described in Art. 2. Notice of such transfer shall be sent by the Secretary.

9. Notice of RESIGNATION from membership shall be reported to the Board of Directors, whereupon if all of the member's dues and other indebtedness to the Association have been paid, the resignation shall be accepted and his name removed from the roll.

10. EXPULSION of a member may be considered by the Board of Directors at the request of ten members.

Should there appear sufficient cause, the accused shall be advised of the charges made and shall be given opportunity to make a defense at a meeting of the Board of Directors, of which meeting he shall receive at least twenty days' notice. If satisfactory defense is not made, the accused may, by unanimous vote of the Board of Directors, be expelled from membership.

A member may, at the discretion of the Board of Directors, be expelled for non-payment of dues when same are left unpaid for one year.

11. REINSTATEMENT may, by unanmious vote of the Board of Directors, be made within two years from termination of membership, without payment of entrance fee. Original date of election may be retained by payment of all back dues.

A complete file of the Proceedings corresponding with such payment shall be furnished, provided same are available.

12. TERMINATION of a Membership in the Association, for any reason whatsoever, nullifies all further rights and privileges in the Association and the property thereof.

ARTICLE IV

Dues

1. Entrance fee for membership in the Association shall be Ten ($10.00) Dollars.

2. The Annual dues shall be Ten ($10.00) Dollars.
For firms having less than 2001 employes, $25,00.
For firms having more than 2001 employes but less than 5001 employes, $50.00.
For firms having more than 5000 employes, $100.00.
Honorary members are exempt from all payments.
(Revised September 20th, 1920. Effective January 1st, 1921.)

ARTICLE V

Officers

1. The Officers of the Association shall consist of the President, the First and Second Vice Presidents, the Secretary, the Treasurer, the two Junior Past Presidents and as many directors as there are Sections. These officers shall constitute the Board of Directors of the Association of Iron & Steel Electrical Engineers.

2. The President and Vice Presidents shall not be eligible for immediate re-election to the same office. At each annual meeting a President, two Vice Presidents, a Secretary, a Treasurer and as many Directors as there are Sections shall be elected to hold office for one year, term shall commence on the second day of January.

3. A vacancy in the office of President shall be filled by the senior Vice President. Any other vacancies shall be provided for by the Board of Directors for the unexpired term. Such succession to office or appointment by the Board of Directors shall not render an officer ineligible for immediate election to the same office at the next annual meeting.

4. No officer shall receive, directly or indirectly, any salary or compensation from the Association, either as such officer or in any other capacity, unless such payment is authorized by vote of a majority of the Board of Directors.

5. No officer shall be interested, directly or indirectly, in any contract relating to the operations conducted by the Association, nor in any contract for furnishing supplies thereto, unless expressly authorized by a unanimous vote of the Board of Directors.

ARTICLE VI

Election of Officers

1. The Board of Directors shall, before July 15th, furnish the Secretary a list of nominees for offices falling vacant.

2. The Secretary shall not later than August 1st mail this ballot on official form to all members in good standing.

3. Members not wishing to vote for the nominees whose names are printed on the official ballot, may substitute the names of any eligible members.

4. The voting shall be by secret letter ballot, the voter signing his name on an outside envelope and the ballot being enclosed in an inner sealed and unmarked envelope. To be considered, all ballots must reach the Secretary before September 1st. The results of the election shall be announced at the Annual Meeting of the Association.

5. Only members having responsible charge of and being actively engaged in the application of electricity in the iron and steel or allied industries are eligible to hold office.

6. The President shall on the first day of the Annual Meeting appoint three members, not members of the Executive Committee, to constitute a Committee of Tellers. The Secretary shall deliver to the Tellers, unopened, all ballots received by him; marking the outside envelopes received from members not entitled to vote. The Tellers shall open only the envelopes that are not thus marked, and shall proceed in secret to count the votes received. All ballots and unopened envelopes shall be returned to the Secretary, who shall preserve them for one month. The Tellers shall hand a signed report of the results of the vote to the President, who shall read this report at the Annual Dinner, and shall declare, duly

elected, the eligible persons receiving the greatest number of votes for the respective offices.

ARTICLE VII

Management

1. The affairs of the Association shall be managed by the Board of Directors under this Constitution and the general provisions of the laws under which the Association is incorporated.

2. The Board of Directors shall direct the investment and care of the funds of the Association, shall make appropriations for specific purposes, shall pass upon all applications for admission, shall act upon all questions of expulsion of members, shall appoint all employes and fix their salaries, and in general shall direct the business of the Association either itself or through the officers and committees.

3. The Board of Directors shall adopt a series of by-laws which shall govern its procedure and that of its committees. Such by-laws shall be adopted or may be amended by a two-thirds vote of a quorum of the Board of Directors provided that the text of a proposed by-law or amendment shall be furnished in writing to each member of the Board of Directors at least ten days before the meeting at which a vote of the same is to be taken.

4. The President shall have general supervision of the affairs of the Association, under the direction of the Board of Directors. He shall preside at the meetings of the Association and of the Board of Directors, at which he may be present, and shall be ex-officio a member of all committees. The Vice Presidents, in order of official rank, shall preside at meetings of the Association and of the Board of Directors in the absence of the President, and shall discharge his duties in case of a vacancy in the office. The President shall appoint the following standing committees: Membership, consisting of three members; Editing, of three members; a Finance Committee of three members; a Committee on Safety of six members and a Committee on Standardization of six members. He may also appoint temporary committees from time to time. The members of the Finance Committee shall all be members of the Board of Directors. All Committees shall include at least one member of the Board of Directors.

5. The Secretary shall receive all moneys, and turn them over to the financial institution designated by the Board of Directors, from time to time to act as Trustee for the Association, to be deposited by the Trustee to the credit of the Association. The Secretary shall report such deposits to the President, who shall acknowledge for the same. The Treasurer shall invest such funds as may be ordered by the Board of Directors. The Trustee shall pay all bills when approved by the President and Secretary. The Secretary shall make an annual report and such other reports as may be prescribed by the Board of Directors, from information to be furnished by the Trustee.

6. The Secretary and the Treasurer shall, under the direction of the President and the Board of Directors, be the executive officers of the Association. They shall attend all meetings of the Association, and of the Board of Directors. The Secretary shall prepare the business for all meetings and record the proceedings thereof. He shall personally certify the accuracy of bills and vouchers on which money is to be paid. The Treasurer shall have general supervision over the keeping of the books and accounts of the Association. The Secretary shall furnish quarterly to the Board of Directors a statement of receipts and expenditures and monthly balances. The Secretary shall present annually to the Board of Directors a balance sheet, and from time to time shall furnish such statements as may be required. The Secretary shall conduct the correspondence of the Association and keep full records. He shall be in responsible charge under the President, the Board of Directors and the Editing Committee, of all property of the Association, and shall be responsible for the work of all employes of the Association. He shall perform such other duties as may be assigned to him by the Board of Directors.

7. The Board of Directors may appoint Assistant Secretaries, who shall be under his immediate direction, and shall aid him in all matters.

8. All committees shall be directly responsible to the Board of Directors and shall act under its direction. The Board of Directors may at any time, remove any or all members of the committees and appoint successors. The term of the members of all standing and temporary commitees shall terminate with the appointment of their successors.

9. The reports or actions of all committees shall be addressed to the President, and shall by him be referred to the Board of Directors.

10. The Finance Committee shall have supervision of the financial affairs of the Association. It may employ an expert accountant to assist in auditing the accounts. It shall audit the accounts annually, and send a written report to the Board of Directors not later than September 1st.

11. The Editing Committee shall have general supervision of the Library and the rooms of the Association, and the property therein. The Secretary shall be responsible to this Committee for his care of the property of the Association. The Committee shall make recommendations with reference to books, and shall direct expenditure for books or other articles of permanent value, of such sums as may be appropriated for these purposes. It shall have supervision of the papers to be presented to the Association at its conventions, and of the discussion thereon. It shall have the responsibility of obtaining papers, and shall not accept papers from non-members without special authorization from the Board of Directors. It shall edit all discussions. It shall limit as far as practicable the amount of matter to be printed in the transactions and this shall be put in the third person. It shall decide all questions regarding the publication of papers, discussions and communications.

12. The Membership Committee shall issue all application forms for membership, receive and pass upon all signed applications, and report its recommendation to the Board of Directors, which shall in turn act upon each application, after which the Secretary shall notify applicant of result.

13. The Board of Directors may appoint local Honorary Secretaries to represent the Association in various parts of the world.

14. Four members, in person, or represented by proxy, shall constitute a quorum of the Board of Directors.

15. The "vote of the Board of Directors" shall in all cases be the vote of a majority of the members present.

ARTICLE VIII

Meetings

1. An Annual Meeting of the Board of Directors shall be held prior to the Annual Meeting of the Association. All Committees shall make complete reports in writing to the President for presentation at this meeting. The Secretary shall read these reports and make and read a report of the proceedings of the Association for the past fiscal year.

This report shall be certified by the President, Secretary and Treasurer, and a majority of the officers. The Secretary shall show the entire amount of real and personal property owned, the nature of the property acquired; the amount applied, appropriated and expended; the names of all those admitted to membership during the fiscal year, and the names of transfers, resignations and members expelled for non-payment of dues or other causes. This report shall be filed with the records of the Association.

2. There shall also be held an Annual Meeting of the Association in September, after the Annual Meeting of the Board of Directors, for the presentation and discussion of professional papers, and for the transaction of such other business as may be brought before it. The time and place of such meeting shall be fixed by the Board of Directors. An abstract of the yearly report of the Board of Directors and of all committees, as submitted at the Annual Meetings of the Board of Directors, shall be read at this meeting by the Secretary and entered in the minutes of the proceedings of the Annual Meeting.

3. Other meetings of the Association may be held at such times and places as the Board of Directors shall select. Notice of all meetings shall be sent to all members at least fourteen days in advance.

4. Every question affecting the organization or policy of the Association, which shall come before any meeting of the Association, shall be decided, unless otherwise provided by this Constitution, by the vote of a majority of a quorum.

ARTICLE IX

General

1. A quorum of the Association shall consist of ten per cent of the total number of Active Members in good standing; either present or represented by proxy.

2. Every member entitled to a vote at any meeting may so vote by proxy. Every proxy shall be executed in duplicate in writing by the member himself, or by his duly authorized attorney, and one copy thereof shall be filed with the Secretary before the date on which it is to be voted. No proxy shall be valid after the expiration of eleven (11) months from the date of its execution, unless the member executing it shall have specified therein the length of time it is to continue in force, which shall be for some limited period.

3. The fiscal year of the Associaton shall be the calendar year.

ARTICLE X

Amendments

1. Proposals to amend the Constitution shall be made in writing, signed by not less than ten members in good standing, or by resolution of Board of Directors, and shall be placed not later than July 15th in the hands of the Secretary, who shall send copies of it to all members not later than August 15th.

2. The Secretary's affidavit of having mailed such copies shall be presumptive evidence of notice having been given.

3. Ballots on amendments shall be sent to the Secretary in sealed envelopes and counted at the Annual Meeting of the Association by a Committee of Tellers.

4. If two-thirds of all the members voting declare in favor of the amendment, same shall become a part of this Constitution and become effective the beginning of the next succeeding fiscal year.

5. No amendment to this Constitution shall abbreviate the term of any officer elected prior to the adoption of the amendment.

BY-LAWS

Membership

1. The rights and privileges of Honorary, Life, Active Engineering, Active, Engineering, and Associate Members shall be personal to themselves, and shall not be transferable.

2. The term "member" when used herein, unless otherwise qualified, includes Honorary, Active and Associate Members.

3. Applicants for admission to membership shall enjoy none of the rights or privileges attaching to membership until after they are duly elected, and have paid their entrance fees and current dues.

4. Resignations received 30 days after the beginning of any quarterly period may, at the Secretary's discretion, be received as of the beginning of the quarter.

Publication

5. A list of members, with names and addresses arranged alphabetically, shall be issued in the form of a catalogue at least once a year.

6. The regular publication of the Association shall be the Proceedings, to be issued as directed by the Board of Directors.

7. The Proceedings shall contain all technical papers, discussions, reports and other matter that has come before the Association and that is considered worthy of permanent record.

8. Proceedings, when available, shall be sent with the compliments of the Association to libraries of the principal cities of the United States, and to other libraries and Engineering Societies upon application.

9. To limit the demand from libraries, etc., the Board of Directors may direct the Secretary to make a charge equal to the actual cost of publication of the Proceedings.

10. The price to be charged members for additional copies of the Proceedings, also the price to be charged non-members, shall be decided for each issue by the Board of Directors. This price shall not be less than the cost of publication exclusive of cost of printing advertisements. A discount of 20 per cent from the regular price to non-members will be allowed publishers and dealers.

11. The papers presented at the annual meeting, shall, except as hereinafter provided, be published in the Proceedings, and also when practicable distributed in advance of the meeting.

12. All papers, discussions, and other matter intended for publication in the Proceedings shall be edited and revised in the manuscript.

13. The manuscript of a paper or discussion, after being edited and revised for publication under the direction of the Editing Committee, shall be returned to the author to obtain his consent to the publication as revised. In case the author shall not consent to publication in the form suggested by the Editing Committee, and a revision acceptable to both the Editing Committee and the author cannot be arranged, the paper or discussion shall not be published.

14. No manuscript of a paper or written contribution to a discussion shall be given to the press for publication before it is delivered before the Association, unless by authority of the Board of Directors. Proper credit in every case must be given the Association by the publication in which the article appears.

15. The acceptance of a paper by the Editing Committee shall not be considered a guarantee of its publication.

16. The Constitution and By-Laws of the Association shall be published and distributed as directed by the Board of Directors.

17. Competitive bids must be obtained for all printing and reported to the Board of Directors by the Secretary. The right is reserved by the Board of Directors to reject any or all bids. The contract shall be awarded by resolution of the Board of Directors to the best and lowest bidder. The Secretary, upon being instructed by the Board of Directors, shall execute the contract.

18. Papers presented to the Association shall contain no matter of advertising nature, either for the author or those whom he represents, except at the regular space rates, and then in the advertising section.

19. Authors of papers presented to the Association shall, upon publication, be entitled to fifteen extra copies free of charge when same are available.

20. A copy of Constitution and By-Laws and latest Membership List shall be sent each member upon receipt of entrance fee and current dues.

21. Payment of dues entitles a member to a copy of Proceedings and publications issued during the period covered by such payment.

22. Annual Proceedings shall, unless directed otherwise, be copyrighted.

Board of Directors

23. Regular meetings of the Board of Directors shall be held monthly at an hour fixed by the President.

24. Special meetings of the Board of Directors may be held at the call of the President. Notice of such special meeting shall be mailed to each member of the Board of Directors at least five days before the time appointed for holding such meeting; such notice to contain a synopsis of the business to be considered.

25. A motion to rescind a resolution adopted by the Board of Directors may be entertained at its next regular meeting, provided the Secretary shall mail to each member of the Board of Directors notice of such motion to rescind at least ten days before the next regular meeting is held.

26. The Board of Directors may, at any time, authorize any officer or other person to perform any acts or functions, whenever by reason of death, disability, absence or other cause that may appear sufficient, the proper officer—according to the Constitution and By-Laws—is unable to perform.

27. The President shall submit to the Board of Directors, at the beginning of each fiscal year for approval, a budget or estimate of receipts and expenditures for the ensuing year. It will be the duty of the Secretary to notify the Board of Directors when any estimate has been exceeded. This budget of expense shall be kept within the estimated receipts.

Committees

28. Each standing committee shall, as far as practicable, have a regular monthly day of meeting.

29. Each committee shall keep a record of its Proceedings, including the attendance of its members. All resolutions or reports which each committee shall forward to the Board of Directors for action must be signed by its chairman, and must be in the hands of the Board of Directors before the latter's Annual Meeting.

30. It shall be the duty of the President to have all records of the committees, at the expiration of their term, sent to the Secretary for permanent filing.

31. It shall be the duty of the Finance Committee to make recommendations to the Board of Directors respecting the proper investment or disposition of the funds of the Association; and to direct the attention of the Board of Directors to any charges whatever that it may consider excessive or improper. It shall also prepare for the annual meeting of the Board of Directors a balance sheet showing the financial condition of the Association, including the state of each fund which may be separately invested.

32. It shall be the duty of the Editing Committee to be responsible for the care and maintenance of the Library; to employ a competent librarian when necessary, and to accept donations of books or money for library purposes, on behalf of the Association. It shall prepare an annual report for the fiscal year, showing the state of the library, and giving the names of all donors to the library for the preceding year, which report, when accepted by the Board of Directors, shall be printed and form part of the published proceedings. All moneys received by this committee, or any of its members, which have contributed for library purposes, shall be turned over to the Secretary, then to the Treasurer and paid out by him for the purpose specified by the resolution of the Board of Directors. It may exchange copies of Association Proceedings, if available, for periodicals or other publications.

33. It shall be the duty of the committee to arrange a program of all papers for all regular and special meetings of the Association at which papers are presented. It shall solicit and procure from members suitable papers to be presented at meetings, which papers may afterwards be printed in the Proceedings. It shall not accept any paper from non-members unless au horized to do so by a resolution of the Board of Directors.

34. The committee shall prepare the papers and discussions for publication and shall exercise a general supervision over all publications of the Association. It shall, also, call the attention of the Board of Directors to papers that it may deem unsuitable for publication in the Proceedings, assigning specific reason therefor.

35. It shall be the duty of the Membership Committee to carry out strictly the provisions of the Constitution respecting the election of members, and to pass upon the competency of references of applicants as members.

36. No committee shall, under any circumstances, exceed its authorized appropriation.

37. The functions and duties of each temporary committee shall be defined by resolutions of the Board of Directors. At the beginning of each administrative year the Secretary shall transmit to all the members of each temporary committee whose duties may be continued, a copy of the original resolution constituting such temporary committee.

38. Temporary committees appointed to arrange for the holding of the annual meetings, or for other purposes involving expense to the Association, shall in all cases prepare estimates of the probable expenditures and submit them to the Board of Directors for its approval. The sums granted by the Board of Directors shall in no case be exceeded.

39. It shall be the duty of the Secretary to call the attention of the Board of Directors to work done by any temporary committee outside the scope of the resolution or resolutions under which it acts.

Meetings

40. The announcement of fixed dates of the meetings or conventions, distributed by mail at any date prior to the fourteen days' constitutional requirements, shall be deemed a valid notice of such meetings.

41. At any regular or special meeting of the Association, the President may invite any non-member present to discuss any paper; and the Board of Directors may direct the Editing Committee to publish such discussion subject to the rules governing the publication of discussion by members, provided that the non-member's remarks are germane to the subject under discussion and are of sufficient merit to justify an exception to the general rules that discussions by non-members shall not be printed in the Proceedings.

Payment of Dues

42. Annual dues are payable in advance at the beginning of each fiscal year.

43. Any member that, on the first day of July, shall be in arrears for dues for the current year, shall not be entitled to vote or to the current Proceedings.

44. Candidates elected after the beginning of the fiscal year shall pay dues for the unexpired quarters of that fiscal year. If elected within 45 days of the beginning of any quarter, they shall pay dues for that quarter. Candidates, elected 46 days or more after the beginning of any quarter shall pay dues from the beginning of the next quarter.

45. Statements of account shall be sent to each member whose dues are in arrears, on January 1, April 1, July 1, October 1 and December 15.

46. The mailing of bills or statements to the last address upon the Office Mailing List shall be sufficient notice of indebtedness.

47. Statements of account shall have printed thereon last clause of Sec. 10 and all of Sec. 6 in Art. 3 of the Constitution.

48. Upon application of a member, the Board of Directors may, at its discretion, remit dues.

49. From the annual dues of each member will be deducted $2.50, which will be applied as a subscription to the annual Proceedings.

50. A single payment of $200.00 for active and $150.00 for associate members, in addition to the entrance fee, will exempt a member from all future payments, except upon transfer to a higher grade when an amount equal to the difference between the respective fees will be required. Life membership fees shall be kept in a separate fund, the Association using only the interest on same during life of the member. At his death the fee may be transferred to the general fund.

General

51. No expense shall be incurred by any officer or member of the Association except on requisition approved in duplicate by the President and Secretary. No expense, in excess of $25.00, shall be incurred by any officer or member of the Association without the approval of the Board of Directors. One copy of the requisition shall be forwarded to the Treasurer and one copy to remain on file in the Secretary's office.

52. All invoices shall be received, recorded and approved by the Secretary, then sent to the President, who shall approve same and forward to Treasurer for payment.

53. A copy of the requisition, invoice and canceled check for all money paid out shall be permanently filed in the Treasurer's office.

54. Treasurer shall furnish the Board of Directors, monthly, a financial statement to the end of the previous quarter.

55. The Secretary and Treasurer shall each furnish bond in favor of the Association of not less than $2,500 each. The premiums for these bonds shall be paid by the Association. The bonds shall be renewed as required and kept securely by the President.

DISTRICT SECTIONS

56. To organize a District Section a petition signed by not less than 10 Active and 10 Associate members residing near place of meeting, shall be submitted to the Board of Directors. This petition shall state the place where the proposed Section will meet and approximately the number of men eligible for active membership who reside conveniently near this place. The Board may decline the formation of a District Section when in its judgment such an organization may not be compatible with the best interests of the Association.

57. A District Section shall be known as "A. of I. & S. E. E." (Name of District or City) District Section.

58. The principal work of a District Section shall be the holding of meetings for the presentation and discussion of papers of interest to the Electrical Engineers of the Iron and Steel and Allied Industry.

59.—No action that may purport to represent the policy or organization of the Association or any Section shall be published or communicated to any non-member without the approval of the Board of Directors.

60. District Section meetings shall be so conducted as to demand for their maintenance a minimum of financial support by the Association, consistent with the activities carried on by that Section.

61. The officers of a District Section shall be: Chairman, Vice Chairman, Past Chairman and Secretary.

62. The Executive Committee of a District Section shall be composed of: the Chairman, the Vice Chairman, Past Chairman and two Executive Committeemen, all of whom except the Past Chairman, shall be elected for one year, or until their successors are elected.

63. The Secretary shall be elected by the Executive Committee at its first meeting by a majority vote of all its members.

64. Active members in good standing only shall be eligible for office or voting.

65. The Chairman, Vice Chairman and Executive Committeemen shall not be eligible for immediate re-election to the same office.

66. The duties of the Chairman, Vice Chairman and Secretary shall be those which usually pertain to such offices.

67. The duties of the Executive Committee are to pass on recommendations of the Section Committees as to the operations of the Section, and through the Secretary, inform the Board of Directors as to the operations of the Section, filing a copy of the minutes of each meeting with the Secretary of the Association in the Home Office.

68. The Constitution and By-Laws of the Association shall govern in all matters referring to local meetings.

69. The Eexecutive Committee shall, through the Secretary, two weeks prior to the second last meeting before the summer recess, mail a list of nominees for the offices falling vacant. Members not wishing to vote for the nominees whose names appear on the official ballot may substitute the names of any eligible members.

The voting shall be by secret ballot, the voter signing his name on outside of the envelope, and the ballot being enclosed in an inner sealed and unmarked envelope. To be considered, all ballots must reach the Secretary on or before the day before the second last meeting. The Secretay shall turn these ballots over to the Tellers, who have been appointed by the Executive Committee, on the day of the second last meeting and the results shall be announced at that meeting.

70. The eligibility of a member to vote or hold office in a District Section shall depend upon his residence. Where it is doubtful as to a member's eligibility, the Secretary shall obtain a statement from said member stating that he desires to be considered a member of said Section.

With exception of National Committeemen no Active Member or Associate Member is eligible to vote or hold office or to serve on a committee of more than one section.

71. The Officers and Executive Committeemen shall assume their duties at the end of the last meeting held before the summer recess, and the Excutive Committeemen shall meet and elect the Secretary at this meeting.

72. The Executive Committeemen on or before July 1st shall appoint the following standing committees:

1st—Papers Committees, whose duty it shall be to prepare a program for the meetings as far in advance as possible and publish if possible a program for their year's work on or before September 1st, and to secure and approve the papers to fill this program. The Editing Committee of the Association shall approve all subjects and papers before being presented at any meeting.

2nd—Meetings Committee, whose duty it shall be to make all arrangements for holding the meetings.

3rd—Membership and Attendance Committee, whose duty it shall be to see that all men in the District eligible for membership are given an opportunity to present an application to the Association for membership and that the members are posted as to the time and place of meetings.

4th—Such other Committees as the business of the District Section demands, shall be appointed as Special Committees.

73. The Board of Directors may, by majority vote of all its members, 30 days after notice to local section Secretary or Chairman, rescind the authorization of any section and terminate its existence.

HARNISCHFEGER CORPORATION

(Continued from Page 28)

with individual motor drive for each motion. In this new company were associated Mr. Pawling, Mr. Harnischfeger and Mr. A. J. Shaw, under the name of the Shaw Electric Crane Co., with Mr. Henry Harnischfeger as president. From this time on, Pawling & Harnischfeger became permanently associated with the crane industry.

The ever-increasing demand for P. & H. products has continuously necessitated extensions and improvements to the plant and its facilities. In 1923 a new extension 35,500 square feet was added to the main shops. Power house facilities were increased by the addition of another 1000 H. P. generating unit. The Hercules Steel Casting Plant was purchased in 1924 and forms the last link needed by P. & H. to establish a complete control over the manufacture of their products from raw materials to finished machines.

The recent change of name to Harnischfeger Corporation is accompanied by no change in management, administration or business policies. The same "Quality"—"Service" trademark will be carried by all products of the organization.

THE BAKER R & L COMPANY

Probably the most important development during 1924, in the application of industrial trucks to the iron and steel industry, has been the adaptation by The Baker R & L Company, of Cleveland, of the electric dump truck for blast furnace charging. Large savings in the cost of labor can be made by any furnace not having Larry car equipment, three to five trucks taking the place of three times as many selective laborers.

Two types of trucks readily adapt themselves to tihs service. The first is the dump body type, which consists of a platform truck with either a side or end dumping roll-over body mounted on it. This type is suitable for hauling the limestone, coke and stone from the bins and dumping it into the skip hopper. For the older types of elevator furnaces the regular Elevating Truck is employed and the dump body is mounted on a small, wheeled platform which is designed so that the electric truck may pick it up and carry it from the bins, leaving it on the elevator. Roller bearings are used so that the load may be readily moved by hand from the elevator across the charging floor to the bell.

Another development of interest to iron and steel engineers is the Baker Electric Locomotive Type Crane. This crane is an auxiliary to the large overhead traveling cranes and also has its own particular field, in as much as it is very flexible in operation, and is not limited in its scope. It is suitable for unloading gondola cars from the ground, for unloading box cars, for handling sheet, scrap or pig with a magnet, for loading

and unloading tin plate, bar stock, structural forms, etc.

Its most important feature is the fact that all motions are electrically driven, three motors being employed for this purpose. One motor propels the truck, a second slews the crane, and the third drives two drums for the topping and hoist cables. The power is applied to either of these drums through a very ingenious arrangement of magnetic disc clutches which makes sliding gears or any other arrangement of dog clutches unnecessary and puts the entire control of the crane right into the hands of the operator.

The capacity of this machine is 3000 pounds at a 7-foot radius, or 1750 pounds at a 12-foot radius, and there is sufficient reserve capacity so that the crane may be safely operated with the boom slewed at 90 degrees.

CUTLER HAMMER MFG. C.

Because of the very nature of industry and the years of study of application and performance of motor devices and control, there is always a certain amount of development and refinement in controller design and construction. This is a part of the every-day work of Cutler-Hammer Control engineers.

Among the more specific developments of 1924 of interest to the steel and iron industry are the Inductive Time Limit Starter, a new Master Switch, Crane Limit Stop, a complete line of controllers for use with Fynn-Weichsel A. C. Motor, and new A. C. and D. C. Manual, and combined Manual and Automatic Fire Pump Starters, and an Automatic Reversing Planer Controller.

The Inductive Time Limit Controller involves the application of a new principle of time limit control which, while giving the steel mill engineers the kind of acceleration that they favor, yet eliminates dash pots and other electro-mechanical and mechanical means for providing this time limit acceleration. The use of this type of Inductive Time Limit Controller in connection with auxiliary machines in the steel mill insures a pre-determined performance so that they fit in with a specific time schedule or cycle required to insure the maximum production of the main mill.

The controller consists of magnetic contactors for handling the main line in both directions and a set of accelerating contactors mounted below. The adjustments for the timing of the acceleration are made on the stationary parts and are, therefore, permanent. Adjustments to meet all requirements can be made.

Particular attention has been given to the ease of replacement of wearing parts, permanency of adjustment, reliability of operaiton, elimination of ruptured coil circuits and burn-outs and slow deterioration of arc-rupturing contacts. Arcing tips are provided and the arc shields of the blowout provide a deep channel in which the arc is disrupted. The main contacts are of the butt type.

Two types of these starters are made, one suitable for reversing table service and one for applications where the motor is liable to stall as on screw downs and side guard manipulators.

The new type master for use particularly with Cutler-Hammer magnetic type controllers and which is also used with the new Inductive Time Limit Controller is a compact enclosed structure with a contact cylinder mounted on the square shaft separated by bearings on both sides. Standard C-H non-stubbing contact fingers such as are used in C-H Drum Controllers are mounted on the stationary support, leads to which they are connected also remaining stationary. Pyroplax arc barriers are placed between the fingers and the contact segments automatically lubricated by means of an oil wick which holds sufficient oil for about six months' use.

Stars for Fynn-Weichsel Motors

A complete line of control equipment was brought out in 1914 for various sizes of Fynn-Weichsel A. C. motors. For the smaller sizes the face plate type is used with the operating handle arranged for manipulating from the exterior of the enclosing case. The drum type starter is for use with larger motors and incorporates in its design the non-stubbing fingers, square steel shaft for carrying the contact segments and blowout shields. In all of these starters the design takes care of cutting out simultaneously resistance in each of two secondary windings found in this type of motor.

No-Voltage and Over-load Release are provided. An electrical interlock is so connected that it is necessary for the starter handle to be pushed back to the starting position. A dead man's handle is furnished which must be held down during the operating period. The drum handle must also be moved back to the starting position in case any time the primary contactor should open.

New Crane Limit Stop

This new development in safety limit stops is a compact, rugged unit with a number of features which are so important in the functioning of a safety device. The working parts are liberally designed and arranged to move freely, this ease of operation being still further insured by the provision of ball bearings.

Push Button Blast Furnace—Skip-Hoist Control

Through the application of push button control in connection with a full magnetic controller for the operation of single line blast furnace skip hoists, greater ease and simplicity of operation are possible. This type of controller is a refinement and addition to the present line of C-H Skip Hoist Control equipment.

PACKARD ELECTRIC CO.

The outstanding development of the Packard Electric Company during 1924, which is of particular interest to the Iron & Steel Engineer, was the completion of a new transformer factory. This new factory went into production in the month of April. It provides manufacturing facilities which enable the Packard Electric Company to not only render more prompt service in the matter of shipping transformers, but has sufficient crane capacity to permit of much larger transformers than it has been possible for this company to build in the past.

With the facilities of this new plant available, Packard Power Transformers are now available in sizes up to 10,000 KVA.

Numerous mechanical changes were made during 1924 and the most interesting thing coming out of our developmental department was the Packard tap changer, which provides an external means of changing taps which is manifestly superior to anything heretofore provided for this purpose.

An interesting announcement in the last month of 1924 was to the effect that an entirely new line

of tanks had been designed for Packard Distribution Transformers, and that henceforth the use of cast iron tanks would be discontinued. A new bulletin describes and illustrates the complete line of Packard Distribution Transformers.

THE GEORGE T. LADD COMPANY

There has been a large and growing interest on the part of the steel mill people in the recovery of waste heat from various types of equipment. This has taken the form of installing boilers and economizers to recover the heat formerly thrown away.

The use of water walls to protect the brickwork of combustion chambers shows considerable promise. Apparently we will be able to use smaller combustion chambers by the use of these water walls, and also to obtain higher ratings from the boilers.

The use of economizers has increased, and there, also, have been several installations of air preheaters to recover some of the heat from the exit gases to preheat the air entering the combustion chamber.

Boiler pressures apparently have become fairly well standardized at 350 to 400 pounds.

THE V. V. FITTINGS CO.

The V. V. Fittings Company have had a most successful year in furthering their lines of "V. V." Reversible fittings and "V. V." Safety Switches and Safety Devices. To their line of "Reversible" cast iron conduit fittings have been added many useful and practical types. A neatly designed, sturdy hand Portable Vaporproof Fitting has attracted much attention and demand. This outfit can be furnished either of all aluminum or having the handle and cap only of aluminum, and the guard of brass. A dust-proof and weather-resisting drop lid cast iron cover for the round base plug receptacle fitting, is another attractive type. Cast iron and stamped steel covers for all makes of Toggle switches for use with "V. V." Types P and B are among new developments. A series of Y-Z cast iron boxes with cast iron lids have been designed and made to provide a long-standing demand; separate hubs, end plates and attachments, easily mounted on the ends and sides of boxes permits the quick and easy assembling of any style cast iron box from a small stock of boxes made in 12 convenient sizes. Many other newly-developed fittings and attachments will be shown in their New Issue No. 22, which will be ready for distribution on or about February 20th, 1925.

In this new issue will also be shown the newly-developed Crane and Safety Distribution Panel, the new Type WSRF Combination Safety Switch and Plug Receptacle Device, and a complete listing of Type WBG cast iron Safety Switches in all sizes up to and including 400 ampere in 2 and 3 pole, non-fusible and fusible, for 250, 500 and 600 Volts. This type has been further developed during the past year, and presents the most complete line of cast iron Safety Switches on the market.

THE NICHOLS-LINTERN COMPANY

The Nichols-Lintern Company of Cleveland have, in the past year, developed a very complete line of "Universal" Vapor-proof Signal Lanterns. The most popular in the steel mills is their "Little Brother" No. 40.

This lantern is complete in every detail. In the designing of it, the manufacturers feel they have secured the maximum of signal light efficiency. They have considered fully the electrician on the job, both as to installation and maintenance.

FIG. 1

In the renewal of a burnt-out lamp, the lens is not disturbed in any way, for, by loosening three brass screws, the lower portion of the lantern drops away in a complete unit. This lower portion of the lantern is secured to the bracket by a brass safety chain, which makes the changing of the lamp an easy problem, even though the lantern be in the most awkward position.

If ground illumination is desired, the lantern can

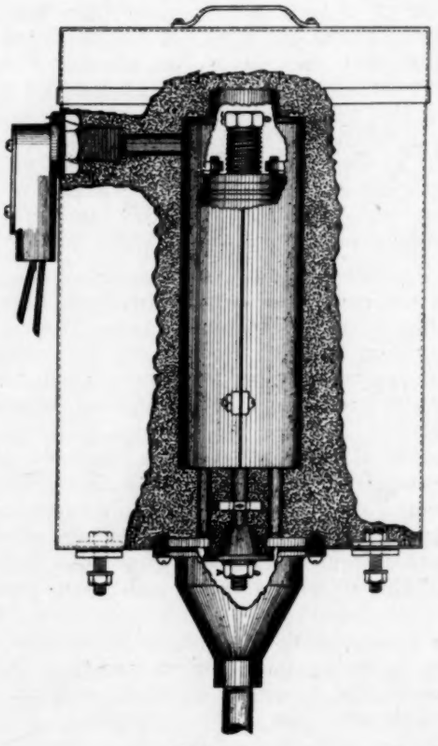

FIG. 2

be equipped with a clear lens in the bottom, or if preferable, with a lens of the same color as the signal lens.

Another important feature is the fact that it has a very light weight. This is due to its being made of cast aluminum and brass, which, of course, does away with the corrosion problem. The manufacturers use the very best fresnel lens obtainable, and this in itself insures a very good signal light, even with the use of a small wattage lamp.

The "Little Brother," as well as the "1-Way" and "5-Way" Lanterns, is furnished with fittings as specified for wall or pole mounting, conduit suspension, or for concealed or open wiring.

The Nichols-Lintern Company have also improved the Lintern Electro Magnetic Sander for overhead cranes. These are now being manufactured as standard equipment with heated air chamber surrounding the sand container, which provides that the condition of the sand must always be such that it will respond quickly and easily.

CROCKER WHEELER COMPANY

THE CROCKER WHEELER COMPANY is ready to offer to the Iron and Steel Industry ANTI-FRICTION BEARINGS in all DIRECT CURRENT AND ALTERNATING CURRENT MOTORS.

The Iron and Steel Industry will also be interested to learn that the Crocker Wheeler Company will soon be able to furnish A COMPLETE NEW LINE OF:

First—Alternating current induction motors.

Second—Direct current motors, completely equipped with Anti-Friction bearings.

The Crocker Wheeler Company was one of the first electrical companies to build a Mill Type motor for exclusive use in the Iron and Steel Industry.

DOUBLEDAY-HILL ELECTRIC CO.

Service above everything else was the subject most generally and earnestly discussed at the weekly Departmental Meetings of the Doubleday-Hill Electric Company, throughout the year 1924. These discussions with subsequent action on each phase of the matter, resulted in increased efficiency and considerable improvement in the quality of the service rendered.

Members of the Doubleday-Hill Electric organization recognize the importance of making the company's slogan—"A Corporation for Co-operation," making real words an actuality and it is expected every member will become imbued with the spirit of co-operation and service, under a new plan, effective January 1, of this year.

The organization will not feel it has reached a point of efficiency until all divisions of the business are rendering service Better than the Best.

THE MONITOR CONTROLLER CO.

A ribbon-type resistor, wound on edge, has recently been developed by the Monitor Controller Company, Baltimore, Md., being intended for service where cast-iron grids would otherwise be employed.

The Monitor Edgewound Resistor unit consists of a high-resistance alloy ribbon wound on edge in helical form and mounted on a steel-reinforced porcelain support which passes through the entire length of the unit, supporting and separating every convolution at two diametrically opposite points. This method of construction relieves the resistor ribbon from mechanical strain and permits of thorough ventilation. The ribbon can operate at any temperature up to red heat without sagging or in any way injuring the resistor as a whole.

A system of terminals and taps enables a unit to be connected into a circuit, and to be interconnected with other units. Two simple forms of clamps provide all these facilities. One is a bridging clamp which makes solid mechanical connection between two adjacent units which serves as a terminal when the units are connected in parallel and also as an end tap, if desired, when the units are connected in series. The other may be used for either of two purposes—as a terminal clamp or as a tap. The taps may be placed at any desired point along the resistor and may be changed at will. This permits of accurate adjustment of the resistance steps.

As the clamps may be used to join ribbons of different sections together at any point, tapered resistors of almost perfect design can easily be made.

Monitor Edgewound Resistors are made in standard units and mounted in frames so that they can be applied in a manner similar to the usual cast-iron grids. The standard section will contain either four or six units mounted horizontally and connected either in series or in parallel. Any number of these sections may be mounted one on top of another. It makes practically no difference whether the resistor as a whole is mounted with the units in a vertical or horizontal position. There are no joints in a resistor section except at the terminals. The ordinary cast-iron section has approximately fifty (50) in addition to its terminals.

On the basis of air temperatures as permitted by the Underwriters, an Edgewound Resistor unit will dissipate seventy-five (75) watts per inch of length. Rating the Edgewound Resistor at thirty (30) watts per inch—less than half the allowance, according to Fire Underwriters—the following comparison can be made with a stanadrd cast-iron grid, as made by one of the large manufacturing companies:

	Cast Iron		Monitor Edgewound	
Watts (continuous duty)	4500		4500	
Length	26½	inches	18	inches
Width	17½	inches	16	inches
Height	7 11/16	inches	8½	inches
Weight	80	lbs.	48	lbs.

From the above figures it will be seen that even when rated at less than one-half the allowance of the Fire Underwriters, the ratio of volume is 1 to 1.5 and the ratio of weight 1 to 1.65 when compared to cast-iron grids.

The porcelain used in the Monitor Edgewound Resistor, being steel supported, is practically unbreakable. Shattering any section of the porcelain itself has no effect upon the operation of the resistor, as the resistive conductor requires only a fraction of the support it actually receives.

As the resistive conductor has a negligible temperature co-efficient of resistivity, the resistance remains the same, whether hot or cold, and there is no tendency toward localization of heat.

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